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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Early 3033 Users Report Channel Director Trouble

By Molly Upton
Special to CW

HAM, Mass. — Users of 033s with very low serial numbers have something in common: the experience of dealing with malfunctioning channel directors, according to an article in *EDP Industry Report* (EDP/IR), a newsletter published by International Data Corp., a research firm.

But despite early problems, many of the users are glad they were able to receive early delivery of 3033s as they said the systems appear to deliver the power IBM promised. One user estimated his system handles six million instruction/sec — eight times more than his 155.

In addition, several users expressed surprise that there weren't more problems with early shipments of a new CPU.

IBM has been retrofitting the early 3033 channel directors in the field and is now shipping systems that apparently have had the problem corrected at the plant.

The problem cropped up frequently in machines with serial numbers under 15, although other machines had some less serious difficulties with channel directors.

The channel director is a box that provides common logic and control functions for groups of six and four channels. The feature is new on the 3033 and reportedly consists of 158 logic. The trouble apparently stemmed from difficulty in timing, which could be out of sync with

(Continued on Page 8)

DP Crime Data Center To Assist Prosecutors

By Brad Schultz
CW Staff

LOS ANGELES — A National Computer Crime Data Center, intended to provide all U.S. law enforcement agencies with up-to-date information germane to the prosecution of computer crimes, has been established here in conjunction with the Los Angeles District Attorney's Office.

The center's main function will be the dissemination of "legal work products" addressed to computer crime. Such products include model search warrants, trial briefs and scholarly articles and texts, according to founder Jay Becker, chairman of the California District Attorneys Association's Law and Computer Technology Committee.

The center will also provide prosecutors with standing legislation and court decisions that relate to computer crime as well as expert opinions on pertinent technical, judicial and ethical considerations, Becker noted.

Case Summaries

Further, the center will distribute case summaries of known computer abuse, including the modus operandi of the perpetrators, as well as quantitative and systems analyses of such incidents.

Finally, the center will provide listings of persons experienced in various aspects of computer crime prosecution, indexed by the nature of their experience.

The center is not intended to store criminal case histories, as does the Federal Bureau of Investigation's (FBI) National Crime Information Center.

Becker said he thought of establishing the center after becoming chairman of the Law and Computer Technology Committee. "I tried to see what our committee could do that would be most valuable to other district attorneys throughout California . . . and the rest of the country," he said.

The committee published several articles that "collated information for lawyers," he recalled. "Then, as I thought about it more, I realized there was no centralized data source prosecutors could turn to when they did have a computer[-related] problem . . . So I decided to create one."

Becker drew up a list of every periodical publisher he thought might be interested in a prospective "National Computer Crime Data Center" and asked them for support.

"And then I started making personal contacts," he said. Last February, he attended a course in computer crime prosecution jointly given by the FBI and the National District Attorneys

(Continued on Page 4)

After Memorex Mistrial

IBM Awarded Directed Verdict

By Catherine Arnst
CW Staff

SAN FRANCISCO — IBM was awarded a directed verdict in the Memorex Corp. vs. IBM trial recently in what several observers termed an "unusual" decision by presiding Judge Samuel Conti.

The case ended in a mistrial last month when the eleven-member jury could not reach a decision after 19 days of deliberation [CW, July 10]

Conti granted IBM's request for a directed verdict in its favor even though the jury members were split nine to two in favor of Memorex. Memorex plans to appeal the judgment.

Several observers said it is very unusual for a judge to issue a directed verdict after he has allowed a case to go to jury. Such a verdict is normally requested and granted either prior to the start of a trial or before the defense presents its case.

Lead IBM attorney Patrick Lynch had said the odds were against the judge granting IBM's request [CW, July 17]. It means Memorex cannot bring the same case against IBM a second time and indicates the judge felt Memorex did not have a valid case.

However, Conti gave an indication that he wanted to avoid another possibly useless trial when at the end of the case he told the attorneys for both parties he did not think it was possible for either side to improve its presentation in a second trial.

In ordering the directed verdict, Conti wrote, "As a matter of law, the record in this case cannot justify a verdict by a reasonable jury in favor of Memorex."

The judge also ruled that if Memorex is granted a new trial on appeal, Memorex's demand for a jury will be stricken. IBM has always opposed a trial by jury.

'The magnitude and complexity of the present lawsuit renders it, as a whole, beyond the ability and competency of any juror to understand and decide rationally. . .

"The jury was originally conceived as a protective shield between the litigants and the danger of an arbitrary decision by the [judge]. It would be a

(Continued on Page 6)

Quake Keeps Things Hopping At DP Centers

By Tim Scannell
CW Staff

SANTA BARBARA, Calif. — Water, power and natural gas lines ruptured, roofs collapsed and at least two computer centers were damaged here when an earthquake rocked portions of Southern California last week.

The computer centers at the University of California and at Raytheon Co.'s Electromagnetic Systems Division here were substantially shaken by the quake. However, neither center sustained any major damage and both were reported operational, to some degree, within 48 hours after the earthquake struck.

The earthquake started at 3:45 p.m., measured 5.1 on the Richter Scale and was followed by several aftershocks, some as strong as 3.75. The eruption was centered on the ocean floor six miles south of Santa Barbara and could be felt as far as 100 miles to the southast in Los Angeles.

Everything that wasn't bolted or tied down moved, Gary Grant, a senior field engineer with Itel Corp., said as he described the scene inside the University of California's computer room during the earthquake. Grant and a computer operator were the only ones in the room at the time.

"Things went flying, the CPU hopped, floor tiles came loose, the ceiling collapsed and the power went out," Grant explained. "I had to go 40 miles just to get to a phone that worked.

"We didn't get power back for three to four hours," he continued, "and when we finally did, none of the machines would work." Eventually, "I got the CPU up and running and started working on the other I/O gear. I had the system up from a completely 'dead' position in less than three hours.

"The only thing that wouldn't work was some of the university's teleprocessing gear," Grant said. "The university has a large net centered around three Interdata machines nicknamed 'Huey,' 'Duey' and 'Louey' and the ceiling fell down on top of them."

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Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529

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AT&T Observers Say

Three-Year Wait in Store for ACS

By Ronald A. Frank
CW Staff

NEW YORK – AT&T's Advanced Communications Service (ACS) may well be Bell's last chance to get into the DP area, but despite its appeal to users, the service will probably not begin for at least three years.

This was the consensus of speakers at a seminar on the impact of ACS sponsored by the Yankee Group here last week.

ACS will have to be sold to the DP manager and there is a very real question whether AT&T will put the necessary marketing muscle into the project, according to Howard Anderson, Yankee Group president. Using ACS, the transmission of data will not be low-cost but it will be easier to get new applications on-line than it is with conventional private-line nets, Anderson said.

Service High-Priced

Another speaker, Ralph Lowry, director of product marketing at Codex Corp., agreed the AT&T data service will be high-priced. He predicted it would cost more than the public data networks already operating. But even at a high price, ACS will be attractive to users with small volumes of data traffic that cannot justify the configuration of in-house networks.

Calling ACS a "public statistically multiplexed network," Lowry said it promises to bring the benefits of multiplexing to smaller users. As these users develop applications on ACS facilities, they may in time increase their volume of data traffic until they are ready to utilize private nets for greater economy, he said.

As users increase their data volume and move into private-line alternatives, networks will develop that will share ACS-type capabilities among a group of users, he predicted.

One-Way Messages

Dr. Jerry Holsinger, chief executive of Intertel, Inc., pointed out that information about ACS released so far by AT&T shows the network is aimed at one-way data messages transmitted using store-and-forward facilities for interactive applications that can tolerate slow response time.

There is some question whether ACS will work with on-line, real-time networks. This depends on delay times, but so far Bell has not released any details on the delay, he said.

Lowry agreed that the network delay could be a problem and cited airline applications which typically need three-second response time to a terminal inquiry.

Consultant Harry Newton told attendees that even though it will take several years to implement ACS, "there is no present threat from any other company to provide a similar service. ACS is built on concepts first implemented in Dataphone Digital Service and the Transaction Network Service, but there will be problems in making the concept work.

Debugging No Strongpoint

The design, building and testing of a 100-city network is far beyond anything AT&T has attempted in the past and software debugging "is not traditionally a Bell strongpoint," he said.

It is doubtful the Federal Communications Commission (FCC) will provide Bell with a resolution approving the ACS proposal. Instead, Bell expects to be required to file a 214 application with the FCC and this will be done next October, Newton predicted.

Regulatory economist Dr. Mauly Irwin pointed to the regulatory issues raised by ACS and questioned whether the FCC could possibly guard against cross-subsidies when it has no proper accounting system and the telephone company supplies so many products to the industry.

With all the products manufactured by Western Electric Co., it would be very difficult to monitor cross-subsidies, Irwin said. Even though some observers look on ACS as an illegitimate extension of a monopoly into a competitive market, others question whether it makes sense to use regulation to deny AT&T the right to expand, Irwin said.

William McGowan, chairman of the board of MCI, said AT&T is basically a service company and not an equipment firm. For this reason, it is not yet clear what equipment will be interconnected to ACS facilities.

ACS might slow down innovation in the private-line network area, but this is unlikely. Until more details are forthcoming on the new service, users should basically stay with the systems they have now, McGowan advised.

Even though the FCC will strive to allow as much freedom of choice as it can, it will still be 1983 to 1985 before Bell will offer a service that begins to look like ACS, he said.

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SOFTWARE INDUSTRY ASSOCIATION

Carter Asks Allies to Halt Computer Sales to Soviets

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Carter Administration has asked four major allies to join the U.S. in refusing to sell computer equipment to Tass, the Soviet news agency [CW, July 24], according to a State Department spokesman.

Last month, the Administration announced it would not allow Univac to sell Tass a $6.8 million 1100 series system, which the news agency had planned to use to aid its coverage of the 1980 Summer Olympics in Moscow.

The Administation blocked the sale after the Soviet conviction and sentencing of dissident computer scientist Anatole Sharansky to 13 years in prison and labor camps.

After the reprisal, Soviet officials said they would buy the computer elsewhere from "more reliable" trading partners. To foreclose that possibility, the U.S. last week asked the UK, France, Japan and West Germany to take action "parallel" to the U.S. decision if the Soviet Union approaches them about providing similar equipment, according to the spokesman.

French Refusal

As of last Wednesday, only France had responded to the U.S. request. According to the United Press International, a spokesman for the French Foreign Ministry said officials in Paris will notify Washington that "it is not the French practice to subordinate the sale of civilian industrial material to political considerations."

The U.S. and the four allies make up the membership of a coordinating committee known as Cocom, a group that screens the transfer of Western technology to Communist nations. Any member may veto a sale by another member if it can show that the sale might compromise a Western defense advantage.

Therefore, even if the allies don't support the U.S. effort to chastise the Soviet Union for what the U.S. considers to be offenses against human rights, the U.S. could veto certain sales on national security grounds, the spokesman said.

House Approves $50 Limit On EFT Users' Liability

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The House of Representatives has overwhelmingly approved legislation that would place a $50 limit on customer liability in electronic funds transfer (EFT) transactions, bringing EFT a step closer to federal control.

While some states and banks have already adopted liability limits of their own, this legislation would place the first federal limit on an individual's liability for unauthorized use of the machines.

If the bill becomes law, in cases where the state law is less strict, the federal law will probably prevail, according to a spokesman for the American Bankers Association (ABA). Where state law is more strict, state law will probably take force, he said, as long as the federal law's minimum protections are guaranteed.

The legislation, approved by a vote of 314 to 2, also covers such electronic banking services as telephone bill paying, preauthorized bill payments and direct deposit of salaries into accounts. It applies to commercial banks, mutual savings banks, savings and loan associations and credit unions.

The bill would exempt financial institutions from liability for account holders' losses if they resulted from fraud or negligence on part of the account holder. "Negligence" on the account holder's part would include his providing means of access to his account by writing his unique access code on his card. It would also include his giving the card to someone else and failing to notify the financial institution when the third party no longer has authorization to access the account.

Failure of the account holder to notify the financial institution within a "reasonable time" of the access card's loss or theft would also constitute negligence on the account holder's part, according to the bill.

Confidentiality Provisions

The bill, originally introduced by Rep. Frank Annunzio (D-Ill.) and amended in the House Banking Committee, contains several provisions for confidentiality. The provisions state that a financial institution may not disclose information regarding any EFT transaction with respect to a consumer account except to the account holder or to "any other person who is a party to the transfer or is necessary to effectuate the transfer, but only to the extent that the information disclosed is necessary to effectuate or correct the transfer."

According to the bill, a financial institution may also disclose individual EFT account information to communicate the terms and history of a credit transaction "as defined in the Truth in Lending Act."

In addition, information may be disclosed to any person "authorized by law to have access to the records of a financial institution in the course of such a person's official duties" pursuant to a court order; and pursuant to the express written authorization of the account holder.

In case of error, a customer has 60 days from receipt of his bank statement to notify the bank of what he considers an error. If the financial institution verifies that an error did occur, it has between one and 11 business days to correct it.

Upon notification of an alleged error, a financial instutition may choose to provisionally credit the consumer for the amount; pending the outcome of an investigation, according to the bill.

Such an investigation would have to be completed within 45 days after the bank's receipt of the error notification. If the financial institution finds through investigation that an error did not occur, it must mail an explanation of its findings to the customer within three business days.

The bill now goes to the Senate, which is presently considering another EFT bill with "almost the same provisions," the ABA spokesman said.

To simplify the legislative procedure, the Senate could replace its own bill and accept the House bill, which would then go to the President for signing or veto. However, if changes were to be made, it would go to a conference committee and return later to both the House and Senate.

DP Crime Data Center Starts in L.A.

(Continued from Page 1)

Association's Economic Crime Project at the FBI Academy in Quantico, Va.

As a result, the center now has a "user network" comprised of some 20 prosecutors who completed the course, Becker said, noting the network normally communicates by telephone or mail and that computerized communications seems unaffordable for the near future.

In fact, Becker was hard-pressed to find a roof under which to operate the center. "Under his authority" as Law and Computer Technology Committee chairman, he set up the center where he works: in the Los Angeles District Attorney's Office. "And then I went to District Attorney John K. Van De Kamp and said, 'Here's what we've done. Would you like to cosponsor it?'

"And Van De Kamp very accurately said, 'Well, you're probably going to use our secretaries, our file cabinets and our time, so yes, I think it's appropriate for the District Attorney's Office to cosponsor it," Becker recalled.

Though the center presently operates on a shoestring budget, maintaining only "half a file drawer" of data, Becker said some federal funding may be in the offing.

The National District Attorneys Association's Economic Crime Project has requested a $10,000 grant from the Justice Department's Law Enforcement Assistance Administration (LEAA) for the center. The project is regularly subsidized by the LEAA, he explained, also noting that the FBI has suggested it may supply services if not funding.

"At this point, I don't see any need to run [the centet] for profit," Becker said, adding he would prefer federal subsidy, perhaps bolstered by "small [user] charges for things like postage and copying."

Explaining why the center's services could be successfully marketed to local, state and federal law enforcement agencies, Becker pointed out that "anyone who is prosecuting a computer crime case is really helping everyone else prosecuting computer crime cases, or who is concerned with computer crime cases." He provides that help by documenting the incident, researching its various implications and gaining experience from which others can benefit.

Becker has also explored the possibility of support from professional associations and the private sector. For example, he expects some "cooperation" from the American Society for Industrial Security (Asis) and other organizations after he discusses his plans for the new center at the society's "international seminar" next month.

Becker's talk "will be an opportunity to brief the people who represent security . . . for large computer facilities within a company," according to Don Shoemaker, program chairman for the Asis seminar.

"We hope we can learn more about what [the center] is and what its plans are," Shoemaker said.

Further information about the center is available from Jay Becker c/o The National Computer Crime Data Center, Room 540, 320 West Temple St., Los Angeles, Calif. 90012.

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But Proposes Privacy Guidelines

OMB Gives OK to Agency Matching Projects

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The U.S. government can go on using computers to spot welfare, social security and student loan cheaters, but only if it abides by guidelines intended to protect the privacy of the individuals involved.

So said the Office of Management and Budget (OMB) in a proposed directive to federal agencies designed to ensure they abide by the Privacy Act of 1974 when they match computer files on individuals.

The Department of Health, Education and Welfare (HEW) provided the impetus for these guidelines with a program that attempted to uncover fraud and abuse by matching computerized lists of federal employees with lists of citizens receiving federal aid and loan payments. [CW, Nov. 21].

Suspended Programs on Again

Because of the controversy that was fueled by charges of privacy violations from the former chairman of the privacy Protection Study Commission, David F. Linowes, and others, HEW suspended similar comparisons of federal payrolls with those individuals getting old age and disability payments under Social Security.

These suspended matching programs will be permitted to continue under the proposed OMB guidelines, and HEW expects to have its computer comparisons rolling again in about a month, the spokesman stated.

Attempt at Balance

The guidelines themselves attempt to balance efforts to curb welfare, benefit and loan fraud with considerations of personal privacy, OMB Director James T. McIntyre Jr. said in releasing them for publication in the Aug. 4 *Federal Register*.

Open for public comment from now until Oct. 2, the latest privacy directive states that matching programs should be used only to ferret out fraud or reclaim federal monies when "the potential overall financial benefits are demonstrable."

Even then, every matching program should be identified and reported to OMB in detail and in advance, the guidelines said. These antifraud efforts should be conducted in a fair and equitable manner so the individuals involved are not prevented from exercising the legal rights provided them by federal programs and the Privacy Act, the directive noted.

Privacy is further protected by the guidelines with the instruction that agencies limit the number of people who have access to the matched data and to contract out such programs to the private sector.

New data generated from the computerized comparisons should not be disclosed for reasons other than the original objective of the matching program. In addition, all new data should be destroyed within six months, unless it is needed for law enforcement purposes, and all original records should be returned within six months to the agency to which they belong or destroyed, the guidelines recommended.

Agencies performing and cooperating in a matching program also should give the public a chance to comment on the use of individual's records before the actual comparison of files begins, the guidelines said.

Similar to OMB's computer security guidelines released here recently [CW, Aug. 7], the matching guidelines called for "physical, administrative and technical safeguards against unauthorized disclosure, alteration or destruction" of individual's records.

"Little is known about matching programs — federal or private," Bob Bedell, an associate general counsel at OMB, said. "We don't know all the matching programs that exist in the government. So far, we've received no complaints that individual privacy rights have been violated, but we're concerned about the potential for such abuse."

The OMB guidelines are advisory rather than mandatory because the agency is primarily an oversight rather than a regulatory body; final responsibility for compliance with the Privacy Act rests with the agencies, McIntyre said.

An early critic of HEW's matching programs, the House of Representatives Subcommittee on Government Information and Individual Rights called the guidelines "pretty good." But there are points in the guidelines that are "extremely disturbing," a subcommittee staff member stated.

The definition of "agency" in the match guidelines is as broad as it is in the Privacy Act. When OMB first gave guidance to the federal agencies on how to implement the privacy law, HEW was criticized for defining itself as an agency, ignoring the fact that it is made up of 11 separate agencies [Oct. 1, 1975], the subcommittee staffer said.

The resulting guidelines thus permit HEW to define matching programs between its Office of Education and the Social Security Administration, both HEW constituents, as an intra-agency exchange not subject to the reporting requirements of the OMB guidelines.

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Surprise Memorex Verdict Makes Few Waves

By Catherine Arnst
CW Staff

NEW YORK — Reactions to Judge Samuel Conti's unexpected directed verdict in the Memorex Corp. vs. IBM antitrust lawsuit were sparse, partly because those most likely to react were on vacation.

Conti announced his decision late in the afternoon on Friday, Aug.11, after the stock market on both coasts had closed for the week. Since the New York City newspapers were on strike, there was no published report of the decision in the financial center until Monday, Aug. 14. The stock of both companies showed little effect, however.

Memorex issued no official statement — a company spokesman said only that "our counsel finds the court's decision incredible" and the firm plans to appeal.

Not even IBM had held out much hope Conti would grant its renewed request for a directed verdict in its favor, since he had denied similar requests three times before. Conti's change of mind was based on his belief, after sitting through the five-month trial, that the case was too complex for any jury to decide rationally.

"But should any case be too complex for a jury to understand?" the Memorex spokesman asked. "The Sherman Antitrust Act is very clear — it is the interpretation and obfuscation by lawyers and judges that have caused the complexity," he said.

IBM 'Delighted'

IBM chairman Frank T. Cary had, of course, a much different interpretation of Conti's decision: "We are delighted with the court's decision. Six federal judges have agreed that IBM's business practices are legitimate responses to the needs of our customers and to competition. As I've said before, there ought to be a limit to the number of times we must go to trial on these old issues. Each trial seems to be a repetitious waste of time, money and energy."

Whether repetitious or not, IBM will continue to face further antitrust trials, the most immediate being the Transamerica Computer Corp. case scheduled to go to trial Nov. 9 in San Francisco. Transamerica president James Rush sees no reason Conti's order in the Memorex case would increase any possibility of a settlement in his company's case.

"We're disappointed for Memorex. Conti's action was extremely unusual but it will have no particular effect on our case," Rush said. He maintained that Transamerica's case is essentially very different from Memorex's, although he did admit that pricing actions were at the heart of both.

And of course, IBM will continue to face the government in the three-year-old U.S. vs. IBM antitrust trial in New York, which is currently in recess until Sept. 11. Memorex's case was very similar to the government's in both the issues involved and the evidence presented. Conti's decision will have no effect on the Justice Department's case, however, according to Assistant Attorney General John H. Shenefield.

The government would consider filing a friend-of-the-court brief in support of Memorex's position when the firm files an appeal, Shenefield said, although no such move has been considered as yet.

Conti Awards Directed Verdict to IBM

(Continued from Page 1)

subversion of this ideal to insist upon submitting a case to a jury when there is a substantial risk that its decision will be arbitrary," Conti said.

Memorex vs. IBM lasted 96 trial days spread out over five months. There were 19,000 pages of transcripts, 87 witnesses and 2,300 exhibits placed in evidence. The jury expenses, which are borne by the federal government, amounted to more than $32,000.

A pool of 175 prospective jurors was called for this, but after excuses granted largely because of the anticipated length of the trial, there were only 29 candidates left from which to select 14 jurors. Three were excused early in the case. Several jurors interviewed after the trial said the case was too complex to be tried by a jury. The foreman, the only juror with any prior technical knowledge, said that a qualified juror would have to be a computer technician, a lawyer and an economist.

One Trial Only

A second trial by jury in this case could easily result in another mistrial and, Conti said, "while there may be a right to a jury trial in every case, the court feels that where the cost to both the litigants and the government of such a trial is as great as it was in this case, and where the case is as technically and financially complex as this one is, this right should be limited to one jury trial."

In granting IBM's request for a directed verdict, Conti rejected all of Memorex's charges against the defendant. Specifically, Conti addressed four areas in his order: markets and monopoly power, pricing, damages and acts.

Ignored Reasonable Alternatives

In the area of markets and monopoly power, Conti determined that Memorex failed to prove that general-purpose computers and plug-compatible disk drives, disk drive control units and communications control units were relevant markets because it ignored the "reasonable alternatives" available in the marketplace.

For example, the general-purpose computer systems market defined by Memorex excluded such products and companies as minicomputers, programmable communications control units and terminals, software suppliers, leasing companies and service organizations, Conti said.

In another comment on the market, the judge said, "There are or could be comparable plug compatible markets for the other systems manufacturers. A market definition that would inevitably lead to so many monopolies should be carefully scrutinized."

As for IBM's market share, Conti considered Memorex's measurements inaccurate. "Regardless of IBM's market share, it lacked the power to control prices or exclude competition in these markets . . . IBM was forced to lower its prices on numerous occasions to prevent plug-compatible manufacturers from squeezing it out of these markets entirely."

Pricing, which was at the heart of the Memorex lawsuit as well as most of the other antitrust actions brought against IBM, was Conti's strongest case for asserting that the issues were too complex for a typical juror to comprehend.

There are two tests by which to prove predatory pricing: pricing below marginal or average variable costs; or pricing above marginal or average variable costs but below the short-run profit-maximizing price where barriers to entry are too high.

Claim Invalidated

Memorex used the second test and so acknowledged that IBM did not price below average variable costs. However, Conti discounted Memorex's claim that barriers to entry in the computer industry were overly difficult, thereby invalidating the second test.

"Memorex itself made the changeover from original equipment to plug-compatible manufacturer very quickly. Other companies have been able to enter the plug-compatible markets directly, and systems manufacturers have also entered with relative ease," Conti said.

Memorex's calculation of damages, which equalled $306 million and would have been tripled by law if the jury had granted damages, were too imprecise, and a "verdict rendered on the damage evidence offered by Memorex would have been speculative," Conti said.

In the segment of the case dealing with "acts," Conti's order addressed six subjects: interface disclosure, the fixed-term plan, the 2319A and 2319B disk drives, the new attachment strategy, the 3705 communications control unit and the 370 models 115 and 125.

Conti found that all of IBM's policies in these areas were justifiable because they were "reasonable response(s) to competition" and were standard practice in the industry. Conti had instructed the jury that actions which were permissible in a competitive market could be considered predatory when performed by a firm with monopoly power.

"Users clearly benefited from [IBM's] product innovation and price cuts . . . This kind of conduct by IBM is precisely what the antitrust laws were meant to encourage . . . Memorex sought to use the antitrust laws to make time stand still and preserve its very profitable position," Conti said.

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Brandon Predicts Its Demise

EDS vs. Schaefer Seen Lesson in Flaws of FM

By Howard A. Karten
CW Staff

NEW YORK — The performance and conduct of Electronic Data Systems, Inc. (EDS) in its business with the F. & M. Schaefer Brewing Co. can serve as an instructive example in appraising the future of facilities management (FM), Dick Brandon, president of The Brandon Group, believes.

In a telephone interview, Brandon cautioned that he was speaking from memory about documents made public during the trial between Schaefer and EDS, which he termed "the prime company" in the FM area.

The first part of this report on Brandon's views of FM appeared in last week's issue. The conclusion appears next week.

EDS, which recently settled a combined suit and countersuit out of court with Schaefer [CW, June 5], was allowed to virtually dictate systems specifications to Schaefer under the terms of the contract between the two parties, Brandon believes.

The contract "explicitly said Schaefer personnel would not be involved in system design . . . that Schaefer would simply approve or disapprove [the EDS] design . . . There was no integration in the design phase of any kind of Schaefer management requirements; there was not real communication" between the two parties, Brandon stated.

This view was vigorously disputed by Tom Marquez, a vice-president and director of EDS in Dallas. "There's no way we can design a system and [have] the customer say 'yes or no.' What customer would ever do that? The customers are the ones who understand their business, and you have to work together . . . . We bring the DP expertise to fulfill their needs, but they're the ones who have to tell us, 'Here's what we need; here is how often we need these reports' and so on. The process requires a lot of give and take."

Business 'Not Long-Term'

That such disputes arise at all, Brandon said, means facilities management "is not a long-term business in the private sector." In the long run, there will be no real FM activitity in the private sector because "it doesn't make sense," Brandon commented.

"I would say in the next five years we are going to see the demise of almost all commercial FM contracting in the private sector." The FM business itself was "spawned by a lot of significant failures in DP internally," Brandon added.

This view was also disputed by Marquez, who noted that International Data Corp. of Waltham, Mass., just released its 1978 briefing which shows FM will go from a $575 million business to more than $1 billion by 1982. That "doesn't sound to me like a dying business," he said.

As additional ammunition for this view, Marquez cited a study by Input, a consulting company in Menlo Park, Calif., that projects "probably a business of $1.5 billion by 1982. As time goes on, we see more and more competitors getting into FM, which is another good indication it is not dead."

Speaking of his own company, Marquez said, "When we went public less than 10 years ago, our total revenues were $7.7 million; they're well over $200 million now, and 95% of our business is FM."

Contract Renewals

Brandon contends, nevertheless, that very few — if any — companies whose facilities are being managed by an outside vendor have renewed their contracts. "If you look at commercial FM contracts, I don't think you can find any that have ever been renewed . . . I know of one case where the customer is happy, but that customer represents 80% of the business of the facilities manager." Brandon did not state whether this contract had been renewed.

The nonrenewal situation comes about in part, according to Brandon, because of the imbalance in contracting experience between the manager and the managed. "You, as a user, sign a contract once every five or 10 years and have no experience at all in this area," whereas an FM vendor has the experience many times over. Brandon said that to help people avoid the problems of signing such contracts, his company has prepared a free checklist of the pitfalls to avoid.

Brandon also charged that EDS — which he called a "very clever and a very good organization in a lot of ways" — signs its customers to very long-term contracts (eight years for the basic contract).

"EDS knows that inherently it must tie its customers for long enough, because if it doesn't, they aren't going to renew. At the end of the period, almost every customer establishes his own department."

This, too, was denied by Marquez, who noted that approximately 80% of the contracts that come up for renewal have, in fact, been renewed. "Our initial period has run from five to eight years, [but] we have quite a few three-year contracts that have been renewed three or four times."

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Early 3033 Users Share Channel Director Woes

(Continued from Page 1)

that of the CPU, thus causing system crashes.

Of eight users interviewed, only Rensselaer Polytechnic Institute (RPI) in Troy, N.Y., with the high serial number of 44, reported no channel director-related problems. A couple of users declined to comment extensively, but they did indicate they had encountered problems.

Although overall system performance has won high marks from users, the channel architecture itself (unrelated to the directors) is not quite so popular. Several mentioned difficulty in keeping the loads balanced on their disk channels. Judging from what the users say, a load exceeding 40% of utilization can cause problems.

One user pleaded for a minicomputer bus-type arrangement that would relieve him of the responsibility of deciding how best to assign specific data to disk storage. "Why should I have one channel functioning at 100% of capacity and another one at 0%?" he asked.

IBM apparently devised the remedial procedure for the errant channel director at the site of a defense contractor in Florida whose machine has a very low serial number. Although the problem was obviously in the director, IBM needed almost six weeks to fix the system.

But the user was not discouraged because he said the 3033 came back up quickly and was so much faster than the 8M-byte 168 attached processor it replaced that he didn't lose much production time by previous standards.

The system is now functioning about 99% of the time on a 24-hour basis. IBM takes the machine most Sundays for maintenance.

Another user with a relatively low serial number system said IBM fixed his channel director in 18 hours. The system failed shortly after IBM had turned it over to the user, but it has since been running with good uptime and there have been no further problems from that sector, the user said.

Plan for Power, Users Advise

The IBM teams installing 3033s got high marks from users for their fast work. The teams work in 12-hour shifts and have installed 3033s in as little as one weekend, according to an article in *EDP Industry Report*, a newsletter published by International Data Corp.

But there are some things users can do to assure an expeditious installation, 3033 users indicated. The power requirements may be more extensive than for the older systems, so users should ascertain prior to the arrival of the IBM teams that their new power units are going to function properly.

One user found to his dismay that the two 400 MHz generators didn't run in parallel, and he had to call in the generator supplier, thus extending the installation time.

Another user had service representatives from the power company standing by during the installation, which turned out to be a wise move.

General Dynamics in Fort Worth, Texas, took machine number 13 about the first of July and was still in the process of cutting over to the new system a month later. A spokesman admitted there have been some problems with the channel director but said results have not been conclusive on the system, which is replacing a 168. General Dynamics is also getting another 3033 that will be in addition to a 168 multiprocessor.

The Singer-Kearfott 3033 installation in New Jersey during May was complex because the company made "a multitude of changes" involving its operating system (from MVT to MVS); its international communications system; and disks — it now has 3350s, according to Tom Bell, director of DP systems and technology.

"It's easy to take a negative attitude, but I'm surprised it turned out as well as it did ... . We haven't missed a closing, and there would have been problems even going from a 165 to a 168," he said.

Bell, who is having channel director problems, is collecting data on being an early 3033 user for presentation at the Share meeting this month.

The Singer-Kearfott machine was the only one EDP/IR found with three directors. The others had 12 channels and two directors, the minimum on the system; a 16-channel machine has three directors. Singer's 3033 replaced a 165 and 168, each with 3M bytes of memory and six channels.

By late May, when IBM shipped number 34 to Avco's California plant, most of the engineering changes had been made prior to delivery, according to Brad Brackman, operations manager. But IBM spent another four to six hours changing some power cards and other items after delivery, he said. This was considerably less time than the 48 hours IBM had originally requested to do the work, he added.

Avco has installed a channel rotation unit obtained through an IBM user group in an attempt to alleviate overloading on disk channels, he said. The Avco CPU is not fully loaded, but runs an average of 30% to 40% utilization, he added.

RPI had completed a two-year procurement study and was leaning toward Amdahl Corp. when IBM announced the 3033, according to James Moss, director of computer services. It signed promptly with IBM, which, unlike Amdahl, has an educational discount, and took machine number 44. Its 3033 was installed so smoothly RPI kept its 360/67 in parallel operation for only two days, he said.

Moss had heard of problems with the channel director but said his machine had an engineering change made prior to shipment.

Hard performance statistics are only now being developed by users, but some were happy to divulge their impressions. Not only did the 3033 get high marks, but those users with MVS/SE, a software performance booster, were pleased with it as well.

RPI's 4M-byte 3033 is in the range of 10 to 12 times faster than the 1.5M-byte 67 it replaced, according to Moss.

Another user thinks he is getting more power than from his 8M, 168 attached processor.

Upton is managing editor of EDP Industry Report *and a former associate editor of* Computerworld.

Quake Sets CPUs Hopping

(Continued from Page 1)

The university's computer center has an Itel Corp. AS/6, which managed to survive the earthquake with a minimum of damage even though it "moved four to five inches," he said.

"Essentially, in regard to the circuitry of the machine, all I did was take out and replace the cards. There were a variety of fuses and circuit breakers blown, and we discovered problems with other vendors' equipment. But that's expected," he quipped, "because most machines are not designed to withstand earthquakes."

Ruptured Sprinkler

Nearby, at Raytheon's computer center, the bulk of the damage to the equipment was caused, ironically, by a sprinkler system on the floor above which burst during the quake and leaked water through the ceiling. "We actually had very little damage from the shake," Robert Kluherz, manager of information processing for the division, stated. "It moved the equipment around the floor but none of [the machines] fell over. The only thing that fell over was a full tape rack which smashed into a tape drive," he added. "All we got out of that was a couple bent doors."

All of the machines in Raytheon's computer room were drenched by the ruptured sprinkler system, particularly an Itel memory system and several Itel disk drives whch had a "considerable amount of water damage," Kluherz said. Most every card and board in the Itel machine and many of those in the peripheral equipment were removed and dried using rags and portable hair dryers. This process took several hours.

Off Its Feet

The center's mainframe, an IBM 370/155, received relatively little damage during the apparent bedlam. "It moved about two or three feet across the floor, came off its feet and landed on its wheels," Luherz explained, "but we only had to replace a few circuit cards."

The computer system at Raytheon was reportedly fully operational exactly 49 hours after the initial tremors.

Grant and Kluherz agreed there is little that can be done to preventearthquake damage to computer rooms and equipment. However, Kluherz said Raytheon would review the present sprinkler system and investigate preventive measures to minimize or eliminate the water problem.

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Net Matches Kidney Donors With Recipients

By Marguerite Zientara
CW Staff

RICHMOND, Va. — A computerized information retrieval network is helping match kidney donors and recipients at organ transplant centers throughout the country.

The Southeastern Organ Procurement Foundation (Seopf), in existence since 1969, opened its system to the rest of the country in December 1976. There are now 135 transplant centers throughout the country "either on or in various stages of coming in," according to Gene Pierce, Seopf director.

Kidney sharing itself began in 1968. "We knew in order to share kidneys over a large geographical area, we had to have a mechanism to match recipients and donors by antigens," Pierce said. "It was a natural progression to use a computerized system."

Antigens are proteins in the surface of a cell that determine a person's tissue type. There are approximately 40 types of known antigens on an A and B locus and about 50,000 possible combinations of them, Pierce explained.

Each person has four prominent antigens; donor-recipient matches can be made for one, two, three or four antigens.

Potential Recipients

The network contains information about 3,100 potential kidney recipients. For every patient, the system indicates name, age, sex, blood type, percent of reactive antibody, how many transplants he has had, the hospital name, telephone number of the person to contact and the date the entry was made, Pierce said.

When a hospital has a donor, recipient information in the system is accessed by inputting a list of the donor's antigens. If a good match is found, the donor representative calls the potential recipient's contact to determine whether the recipient is in good enough condition to receive the kidney.

If the recipient can receive it, the kidney can be put into a special salt solution in a Styrofoam container and put on a commercial airline or chartered flight for delivery.

"The system has helped prevent the wastage of kidneys and has helped to get the rarer types of kidneys utilized," according to Dr. Robert Schweizer, head of the transplant service at Hartford Hospital in Connecticut. At the end of June, for example, the system was successfully used to find a kidney donor for a 20-year-old man at Hartford Hospital who had rejected kidneys twice before.

The kidney came from the University of California at Sacramento, where doctors had entered the donor's data into the system because the kidney could not be used at that hospital. They found it was needed in Hartford, packed it in cold storage and sent it along. The transfer to Hartford marked a distance record, according to Schweizer.

"The four-antigen match — the best he could have had — has worked well," Schweizer said. "Six weeks after the transplant, the kidney is functioning well and hopefully he'll be able to keep this."

The system also allows the listing of unacceptable antigens for a particular patient, Pierce said.

The system can be used for heart, liver, cornea and bone marrow transplants as well, but they are much less common than kidney transplants.

The information system, which averages four inquiries a day, runs on General Electric Co.'s Mark III timesharing network.

> *'The system has helped prevent the wastage of kidneys and has helped get the rarer types of kidneys utilized.'*
>
> \- Dr. Robert Schweizer

Calendar

Aug. 22, New York — **State of the Art in Backup Computer Facilities**, sponsored by Data Processing Security, Inc. Contact: R.J. Bessenhoffer, 235 N.E. Loop 820, Hurst, Texas 76053. Also being held Aug. 23 in Chicago and Aug. 24 in Los Angeles.

Sept. 12-14, Andover, Mass. — **Tomorrow's Information Systems Manager**, sponsored by the Institute for Graphic Communication, Inc. Contact: Richard D. Murray, director of conferences, Institute for Graphic Communication, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

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Afips Chooses IBMer as Chairman of NCC '79

MONTVALE, N.J. — The American Federation of Information Processing Societies (Afips) has named Merlin G. Smith of IBM's T.J. Watson Research Center 1979 National Computer Conference (NCC) chairman.

The conference is scheduled for next June 4-7.

Smith is president of the Institute for Electrical and Electronics Engineers Computer Society, a member of the Afips board of directors and a past chairman of the NCC board.

Smith joined IBM in 1952 and participated in the firm's early computer system development, an Afips source noted, adding Smith was subsequently responsible for research and advanced development projects in logic and memory technology. He is currently involved with the extension of digital design in very large-scale integration.

In other news, Dr. E. Ronald Carruth, an authority on educational and school administrative DP applications, and Robert J. Marrigan, a professional ethics and right-to-privacy advocate, have been named to the Afips Executive Committee.

Carruth, who supervises the allocation of DP services to the Minnesota School Districts Data Processing Joint Board, will join the committee, which monitors the ongoing activities of Afips. Prior to 1971, Carruth directed several computer-related educational projects for the public schools of McComb, Miss., an Afips source noted, adding that Carruth is a member of Afips' board of directors and a past president of the National Association of Users of Computer Applications to Learning.

Marrigan, who authored the Data Processing Management Association's (DPMA) *Standards of Ethical Professional Practice Regarding Individuals' Rights of Privacy*, was a member of the DPMA steering committee during formation of the Information Privacy Research Center at Purdue University, the Afips source said, and holds a Certificate in Data Processing.

Other members of the committee are Albert S. Hoagland of IBM, the Afips president; J. Ralph Leatherman of Hughes Tool Co., the federation's vice-president; Sylvia Charp of the Philadelphia School District, the Afips secretary; Walter A. Johnson of Consolidated Papers, Inc. Afips treasurer; Carl Hammer of Sperry Univac; Per Holst of the Foxboro Co.; and Samuel Levine of the U.S. Army Communication Research and Development Command.

Smith

Carruth

Marrigan

McDonough to Chair IAC

WASHINGTON, D.C. — The Interagency Committee on Automatic Data Processing (IAC/ADP), an organization of DP mangagers within the federal government, has elected Francis A. McDonough chairman for the upcoming year.

McDonough is the director of the Office of Computer Science for the U.S. Treasury Department. David B. Albright, director of DP systems for the Department of Housing and Urban Development, was also elected as the group's vice-president, a spokesman said.

IAC was established in 1957 to provide a forum for DP managers working for the government. Among its activities, the group is responsible for preparing position papers and it occasionally makes recommendations for improving management of DP services within the federal government.

Urisa to Hold Mini Workshop On Applications

CHICAGO — A minicomputer workshop aimed at state and local government professionals interested in urban and regional information systems will be held in Boston Nov. 13-14, sponsored by the Urban and Regional Information Systems Association (Urisa) in conjunction with the Municipal Finance Officers Association (MFOA).

Minicomputer Applications in Local Government was designed to introduce the finance director, accountant or other public official to the technology of minicomputers, a spokesman said. Emphasis will be placed on the management aspects of minicomputer systems, with specific concern on financial implications.

The registration fee for MFOA members is $150 while nonmembers will be charged $200, a spokesman said from Suite 800, 180 N. Michigan Ave., Chicago, Ill. 60601.

ASI Plans Meet On DP Training This October

ELK GROVE VILLAGE, Ill. — U.S. Rep. Barry M. Goldwater (R-Calif.), syndicated financial columnist Eliot Janeway and *Computerworld* columnist Jack Stone are among the more than 20 speakers scheduled to appear at Advanced Systems, Inc.'s (ASI) Professional Training Conference in Chicago Oct. 30-31.

The two-day conference, expected to attract more than 350 representatives from business and government organizations, will focus on DP-related training procedures and current developments, a spokesman stated.

Topics of discussion will include instructor training techniques, structured systems analysis and computer systems design, human resources management and motivational training.

Preregistration and "at-the-door" registration fees for the conference are $95 and $120, respectively. Information can be obtained from ASI at 1601 Tonne Road, Elk Grove Village, Ill. 60007.

Call for Papers

TELEINFORMATICS '79, Paris, May 28-30, 1979.

Topics to be covered include office automation, word processing, teleconferencing and the management of distributed organizations, new industrial and commercial marketing opportunities, teletext and viewdata, electronic mail, entertainment and leisure activities, computer-aided instruction and educational systems, electronic fund transfer and automated banking, electronic newspapers, public information, dissemination, security and authentication, impediments to progress (technical and political) standardization issues, value-added networks and news services, communications techniques and microelectronics.

Intention forms must be submitted as soon as possible. Forms are available from Dr. Thomas H. Martin, Annenberg School of Communications, University of Southern California, Los Angeles, Calif. 90007.

THIRD INTERNATIONAL CONFERENCE ON COMPUTER APPLICATIONS IN THE AUTOMATION OF SHIPYARD OERATION, University of Strathclyde, Glasgow, Scotland, June 18-21, 1979.

Authors should submit an abstract of not more than 300 words as soon as possible to the International Programme Committee, ICCAS 79 Office, Department of Shipbuilding & Naval Architecture, University of Strathclyde, Glasgow G1 1XH, Scotland.

IEEE INTERNATIONAL SOLID-STATE CIRCUITS CONFERENCE, Philadelphia, Pa., Feb. 14-16, 1979.

Papers covering the design, performance, fabrication, testing and applications of new solid-state circuits, device structures, phenomena and systems are invited. All papers should be suitable for a 20-minute presentation and must not have been previously published or presented.

Authors must submit 20 copies of both a 35-word abstract and a 300-500-word summary which will be used to select papers for the conference. Abstract/summary should be received by Sept. 25 by Lewis Winner, 301 Almeria Ave., P.O. Box 343788, Coral Gables, Fla. 33134. Overseas authors should send abstract and summary to (European) W. Engl, Institut Fuer Theoretische Electrotechnik, Technische Hochschule Aachen, Templergraben 55, 51 Aachen/W. Germany or (Asian) K. Kataoka, Integrated Circuit Laboratory/Musashino Electric Communications Laboratory, Nippon Tel/Tel Public Corp., 3-9-11 Midori-cho, Musashino-shi, Tokyo, 180, Japan.

SUMMER COMPUTER SIMULATION CONFERENCE, Toronto, Ontario, Canada, July 16-19, 1979.

Original technical papers on all aspects of computer simulation are solicited including but not limited to such areas as physical, chemical, environmental, life, managerial and social sciences.

Deadline for three- to five-page double-spaced abstracts/summaries is Nov. 1, with acceptance/rejection notification by Dec. 15. Complete camera-ready copy which will be published in the conference proceedings is due by Feb. 15. Contact: Dr. Leon Levine, Program Chairman, 1979 SCSC, Computer Science Dept., University of California at Los Angeles, Los Angeles, Calif. 90024.

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House Group Agrees With GAO

Interior's DP Needs Consolidation, Study Says

By Brad Schultz
CW Staff

WASHINGTON, D.C. — The recent Government Accounting Office (GAO) study that found widespread waste and misuse of computer resources in the Department of the Interior largely reiterated the findings of another report — this one by the House of Representatives Appropriations Committee's investigative staff.

The latter report also placed blame for the department's DP woes on the shoulders of its DP middle managers and its top administrators.

Interior should consolidate its DP operations and bolster the authority and sanctions of the department's Office of Automatic Data Processing and Telecommunications Management (ADP/TM), the report said, noting Interior "never stopped the [DP] proliferation process to look at departmental consolidation and the accompanying economies of scale.

"Each [component] bureau continued its individual, autonomous planning and contributed to the inefficient [Interior DP]-structure which is the end product of uncoordinated empire building. The result is inefficiency and duplication of systems and data bases," the appropriations report said.

Consolidation Advised

The report advised consolidating 21 Interior DP centers into no more than four or five and said eight separate telecommunications networks maintained by the department should be replaced by a single distributed network.

The report blamed Interior's failure to implement ADP/TM's consolidation strategy plan on negligence and lack of cooperation on the part of central DP units within the department's component bureaus and on the apathy of "officials within the Office of the Secretary."

DP managers at the Denver site feared being 'shoved off their thrones' by consolidation.

The ADP/TM office, headed by Harris G. Reiche, had submitted its strategy plan with the endorsement of Interior's assistant secretaries in 1975 [CW, July 31].

A member of Appropriation's investigative staff that prepared this report told CW the General Services Administration (GSA) studied the five Interior DP sites at Denver in 1972 and at that time advised the department to consolidate these facilities into one large DP complex.

The GSA investigators projected then that Interior could save about $45 million in a 10-year period by making the Denver consolidation, the source said, noting this figure agrees with the recent GAO conclusion that such a move would have saved $20 million to $25 million over the past five years.

The source reiterated Reiche's views that DP management at the Denver sites feared being "shoved off their thrones" by consolidation, which would presumably end the "underuse and duplication" of DP resources found there by GAO.

The appropriations report indicated that Interior Secretary Cecil D. Andrus should be ordered by the committee to do the following:

- "Establish an ADP executive review board with total authority for ADP resources, present and future."
- Consolidated DP procurement and management within the Office of the Secretary.
- Give all vendor negotiating responsibilities to a "central ADP organization" in Interior.
- Assign control over all DP procurement funds to the Office of the Secretary.
- Preclude Interior bureaus from committing DP funds except as approved in the President's budget or by Congress.

The first recommendation amounts to a call for reactivating the review board comprised of Interior assistant secretaries and advised by Reiche.

The reports to the committee estimated that DP consolidation "would result in very significant savings to [Interior] of $5 million in the first year alone."

ACM Announces Keynoter

NEW YORK, N.Y. — The Association for Computing Machinery (ACM) has announced that Dr. Richard C. Atkinson, director of the National Science Foundation (NSF), will keynote its 1978 conference. The conference is set for Dec. 4-6 in Washington, D.C.

Atkinson has been director of the NSF since June 1, 1977, having served as the acting director of the foundation since Aug. 12, 1976, a spokesman explained. He is also an experimental psychologist and applied mathematician on leave from Stanford University. His research has been concerned with experimental and theoretical analyses of memory and cognition.

Additional information on the 1978 ACM annual conference can be obtained from Dr. Richard Austing, conference chairman, Department of Computer Science, the University of Maryland, College Park, Md. 20742.

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Christensen to Keynote DPMA Annual Confab

NEW ORLEANS — The Data Processing Management Association (DPMA) will hold its annual International Conference and Business Exposition in New Orleans Oct. 29-Nov. 1 at the Hilton Hotel.

The keynote speaker for the conference will be Billy C. Chistensen, vice-president and director of IBM World Trade Europe/Middle East/Africa Corp., as well as vice-president and general manager of IBM World Trade Corp.

A highlight of the conference will be a special management seminar featuring corporate executives who will outline opportunities for DP managers in corporate-level positions. The session, entitled "DP Arrows Are Pointing to Management — Don't Lose Your Way," will feature panel members Jerry W. Geckle, president of Peterson, Howell and Heather, Inc. of Baltimore, Md.; John L. Jones, vice-president of management information systems at Southern Railway System, Atlanta, Ga.; and Roy N. Linton, president and chief operating officer for Standard Register Co. in Dayton, Ohio.

Among the other management-oriented seminars scheduled are "Managing Human Resources in a Dynamic Organization," presented by Dr. James Cross, technical education support services, The Bendix Corp., Southfield, Mich., and "Why Managers Fail," featuring James F. Towsen of James F. Towsen Associates, Harrisburg, Pa. Also, to help managers avoid failure, George J. Pfeiffer, corporate fitness administrator at Xerox Corp., will speak on "Managing Stress."

Christensen

Other seminars will include "Managing the Small Data Processing Shop With a Minimum of Personnel," presented by Bill Newcomer, president of Dylakor Software Systems, Inc., in Encino, Calif., and "Network Management," given by J.R. Morales-Correa, vice-president of the network services division, SPC Co., Security Pacific Bank of Los Angeles.

"A Rational Approach to Data Security" will be presented by Robert Courtney of the data security development staff, IBM Corp., Kingston, N.Y.

In the area of careers, a "Symposium on Professionalism and Certification" will include panel members Beverly Madron, president of the DPMA's special interest group on certification; Mert Walker, vice-president of the Institute for the Certification of Computer Professionals; Gary Casper, president of the Society of Certified Data Processors; and Jim Brown, director-at-large for the Association of Computer Programmers and Analysts.

"Career Planning for the Data Processing Professional" will be presented by Sam W. Love, director of Houston/New Orleans Source EDP.

Fee for the entire conference including sessions and meals is $185 for DPMA members and $235 for nonmembers. For all sessions, the fee is $125 for members and $175 for nonmembers.

A one-day fee is $75 for members and $95 for nonmembers. There will be a guest program including guided tours and a banquet; the fee for nonmembers is $95.

The student fee for all sessions is $15 for members and $25 for nonmembers.

There is a $10 discount offered on all the above prices for registrations received prior to Oct. 20, except in the case of students.

Registration forms may be obtained from DPMA New Orleans '78, 505 Busse Highway, Park Ridge, Ill. 60068.

Ansi Pondering Standard Update In Handprinting

WASHINGTON, D.C. — The American National Standards Institute (Ansi) Technical Committee on Optical Character Recognition is considering improvements to the standard for handprinted characters.

Public comments and suggestions relevant to American National Standard X3.45-1974 — Character Set for Handprinting — are invited, according to the X3 Secretariat.

The standard defines "idealized shapes for numerals, letters and several special symbols," the Ansi spokesman noted, and "provides a common frame of reference in communications between people and machines."

Copies of the published standard are available for $5.75 plus $2 handling from Ansi, 1430 Broadway, New York, N.Y. 10018.

Comments and suggestions should be sent to the X3 Secretariat c/o the Computer and Business Equipment Manufacturers Association (mark to the attention of X3A1), Suite 1200, 1828 L St. N.W., Washngton, D.C. 20036.

A test for COBOL programmers who think they're structured

```
PROCEDURE DIVISION.
    PERFORM A1-INITIALIZATION.
    PERFORM A2-TOTAL-LINE-PROCESSING
        UNTIL SALES-FILE-EOF-SWITCH = 'Y'.
    PERFORM A3-END-OF-JOB.

A1-INITIALIZATION.
    OPEN INPUT  SALES-FILE
         OUTPUT REPORT-FILE.
    MOVE 'N' TO SALES-FILE-EOF-SWITCH.
    READ SALES-FILE
      AT END
        MOVE 'Y' TO SALES-FILE-EOF-SWITCH.

A2-TOTAL-LINE-PROCESSING.
    MOVE ZERO TO SALES-TOTAL.
    MOVE SALES-RECORD-ID TO PREVIOUS-ID.
    PERFORM B1-PROCESS-AND-READ
      UNTIL SALES-RECORD-ID NOT = PREVIOUS-ID
        OR SALES-FILE-EOF-SWITCH = 'Y'.
    PERFORM B2-PRINT-TOTAL-LINE.

A3-END-OF-JOB.
```

What's wrong with this code?

On the trivial side, condition names should be used to test switches, the numbering scheme for the paragraphs is awkward, and blank lines should never be used to space a source listing. But let's only concentrate on those faults that defeat the purposes of structured coding.

1. All of the modules have general names that make it difficult to guess what their functions are. This makes it difficult to read, test, and maintain the program.

2 The module named A1-INITIALIZATION doesn't represent one and only one function. It is a collection of tasks that are to be done at the start of the program. A module like this represents unstructured thinking, even if the code appears to be structured.

3. The first READ statement is executed in the initialization paragraph. But shouldn't this function be subordinate to module A2, the one that prepares total lines by summarizing the data contained in the input records? Reading the first record of a file before entering the main processing modules is a throwback to unstructured thinking, and it too can dilute the benefits that structured coding promises.

Unfortunately, this code was made up from examples taken from leading books on structured COBOL. In other words, everything that is wrong with this code is presented as right in one book or another. So it's little wonder to me that our industry has a long way to go before it does an effective job of developing structured programs and structured programmers

A better way

If you'd like to learn a better way to develop structured COBOL programs, I'd like to recommend a couple of books to you. They were written by Paul Noll, a software specialist and training manager for a large company in San Francisco. Paul is one of the top COBOL experts in the country and he has some unique ideas about program development. His books are written specifically for the experienced COBOL programmer.

In the first book, *Structured Programming for the COBOL Programmer*, Paul shows you how to create a structure chart that is an efficient guide to your COBOL coding. In Paul's opinion, you can't code decent COBOL without first developing an effective structure chart, so it's curious that most courses on structured COBOL neglect this phase of program development. Next, Paul shows you how to plan the coding for each module in the structure chart. Finally, he gives you detailed rules for writing top-quality structured COBOL.

The second book, *The Structured Programming Cookbook*, is a productivity tool kit for the development of COBOL programs. It gives standards for program development so it becomes an instant standards manual for a structured shop. And it gives complete design, documentation, and code for four different types of business programs. By reducing program re-invention, this book can have a major effect on programmer productivity.

If you are already developing structured programs, I'm convinced Paul's books can help you to improve your methods . . . and your results. And if you haven't yet been introduced to structured programming and the new productivity techniques, you've got some exciting reading ahead of you. Either way, Paul's books may be the best investment you'll make this year.

Mike Murach & Associates, Inc., 4905 North West Avenue, Suite 102,
Fresno, California 93705

Dear Mike: Send me the books I've indicated so I can evaluate Paul's methods for myself. If I don't discover an exciting, new way to develop structured COBOL programs, I'll return the books for a full refund. I understand I will be billed the appropriate price plus freight (plus sales tax in California)

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Management Weak, Study Finds

Federal, Private DP Share Development Woes

By Don Leavitt
CW Staff

WASHINGTON, D.C. — Many of the findings of the federal DP reorganization study's operational management team ["Federal DP Operations in Trouble," CW, July 10] are as true of private installations as they are of the sites in the government to which they refer.

In system development, for example, the team found many agencies do not use project management or any other formal, structured approach to the problems they face. Quality control activity "is the exception rather than the rule" and though there are areas in which standards and guidelines should exist, "they are totally ignored."

For purposes of its report, the team defined system development to include all phases of in-house or contract-developed software from project definition through implementation and postimplementation audit; the purchase and installation of software packages and software obtained through sharing programs; and the modification, maintenance and enhancement of existing software.

"[The] one root cause of the problems in the systems development process is that DP activity is not being effectively managed," the report said.

"Agency management does not generally view the DP function as integral to the success of the agency's mission. Therefore, little or no emphasis is placed on its management or control. The general management view is that DP is an activity for the technicians to worry about. Consequently, DP is managed by technical specialists."

It is this lack of upper management attention that leads DP management to skimp on quality control, audit and evaluation, project management, documentation, standards and the systems development methodology itself, the report continued.

No Incentive for Quality

Under the existing situation, sufficient resources will never be devoted to these activities, the team concluded, adding "the current structure provides no incentive for quality software development. Far too often the push is to 'just get the checks out — we'll do it right later.' "

Without effective oversight from upper management in the form or audit and/or evaluations of what is happening, "there is no reason to believe the situation will improve. To the contrary, with growing dependence on computers, the situation will only worsen," the team said.

In fact, however, the team did not limit itself to pinpointing causes for the problems related to system development; it used 18 of the 46 pages devoted to this part of the study to recommend actions to be taken.

And the report used direct language to get its message across: "It is the belief of this study team that the most important recommendation to improve the delivery of the software product in the federal government is the establishment of a quality control function within each [organization] utilizing DP."

The second recommendation called for a mandate that organizations with DP facilities use a structured process with certain minimum standards for systems development and the management of systems projects.

Currently there is no policy requiring DP functions or their contractors to use an identifiable methodology for the development of software and this encourages an unstructured, undisciplined process, "often by personnel with marginal technical skills," the report contended.

As its third recommendation, the team said there should be more central guidance and assistance provided the operating agencies. The frequent complaint from the agencies is that they have plenty of documentation telling them what should be done, "but little to give [them] direction as to how to do it," according to the report.

Although it devoted a separate section of the report to the question of whether a central consulting function should be established within the government, the team noted, as part of this recommendation, that agencies are not able to attract enough qualified technical and managerial people to meet their needs, so consultation help is needed.

As its final recommendation in this section of the report, the team urged that individual awards be established for outstanding performance in systems development management, adding "monetary bonuses for outstanding performance are a strong positive incentive."

Criteria for the bonus program should be clearly defined and results oriented, the team said. Bonuses should be given for projects brought in on time and within budget, for positive budget performance within a fiscal year or for proper certification and performance of operational systems, the report added.

General distribution of the team's final report, expected to be ready at the end of the month, will be handled by National Technical Information Services, P.O. Box 1553, 5285 Port Royal Road, Springfield, Va. 22151.

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On-Line System Expedites GPO's Document Searches

WASHINGTON, D.C. — A computer has done for the Government Printing Office (GPO) what a magnifying glass did for Sherlock Holmes.

Like the famous detective, the GPO searches through mounds of information — many times without sufficient clues — to locate a specific government publication.

"The computer system has revolutionized everything we do," Jeanne Isacco, chief of the GPO Records Branch, said. "It has taken us from a rather primitive system of retrieving documents by hand to a sophisticated system that saves us a lot of time and effort."

As one of the world's largest publishing houses, the GPO gets about 20,000 inquiries and orders a day on subjects as diverse as honeybees and waste water treatment and for documents like the *Congressional Record.*

The GPO stocks 22,000 U.S. government publications in two huge warehouses in Laurel, Md. Obtaining data about the publications used to involve manual searches through 14 card files and microfiche that filled a quarter city block of office space. The office estimated that responding to orders and inquiries could take up to 30 days.

"We had to stop advertising four years ago because we had reached our capacity," Isacco said. But that situation changed with the installation of the GPO's 4M-byte IBM 370/158.

Since the computer helped increae employee productivity by 40% in the retrieval of information and up to 100% in order picking and mailing, Isacco said, the GPO has once again started advertising its services.

Card Catalogs Discarded

The bulky card catalogs were discarded after the GPO installed IBM's Storage and Information Retrieval System (Stairs), which runs under CICS. Stairs is an on-line, interactive system that allows operators to query the system by using a key word, title, stock number or catalog number.

The GPO's system prints a card that leads trackers like Alberta Thomas directly to a publication.

"The public sometimes doesn't give us very much to go on, and we have to work around that. Sometimes people get very specific with their subjects, and the computer can pinpoint the publications for that narrow interest," Isacco noted.

Using the system, operators now handle an average of 35,000 transactions daily from 75 terminals. The GPO uses IBM 3270-compatible Four-Phase Systems, Inc. CRTs. Data is stored on Storage Technology Corp. 3350-type disk files and Itel Corp. 3330-type disk drives.

"Now we process orders and answer inquiries in four to 10 days," Isacco pointed out. "And we've reaped another payoff — for a change, there is a very positive spirit of cooperation between the GPO and its customers. They used to get annoyed with us for taking so long. Now they're thanking us for being efficient."

Publication records are always current now, she said, since the computer files are updated daily. It previously took eight or nine days for new entries to be recorded on microfiche.

Besides providing an invaluable service for the public, the new system has spared GPO workers a lot of legwork and frustrating searches, Isacco said. "It has definitely improved the morale of GPO workers, and further, it was simple to learn."

Acute Names New Director

ALTAMONTE SPRINGS, Fla. — The Accountants Computer Users Technical Exchange (Acute) has appointed William Perry, the director of professional practices for the Institute of Internal Auditors (IIA), as executive director.

Acute is an organization of nearly 300 accounting firms that use IBM equipment. The user group is devoted to furthering the development of systems, programs, utilization and administration of DP operations, a spokesman explained. Members of the group include certified public accountants and licensed public accountants who perform or intend to perform DP services for their clients on IBM systems the accountants lease or own, he added.

Perry announced that Acute will expand its services beyond its present duties to include educational courses, a DP technical assistance program and a system of voluntary peer review.

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Breaking the Language Barrier

Part III

By Tom DeMarco

IN DEPTH
IN DEPTH
IN DEPTH

In this three-part series, excerpted from Structured Analysis and System Specification, *Tom DeMarco shows how to impose limits on our native language so analysts, designers, programmers and users can safely use it to define what they are trying to develop.*

This week, in the final part of the series, DeMarco details his method, which he calls structured English composition.

You can write structured English by starting out with any description and then applying these steps:

- Flowgraph the description.
- Untangle the flowgraph
- Apply the same untangling operation to the policy description.

There is even a documented technique (the Ashcroft-Manna algorithm) to help you do the untangling.

You *could* go about it that way, but I propose a far easier approach — structured English composition. It works like this:

1. Select one or more linguistic implementations for each of the basic constructs. You might settle on the phraseology we will use here, or you may develop something of your own,
2. Use the catchwords and catchphrases of your implementations to make up a list of reserved words.
3. Add to your list new words that are necessary for describing conditions, relationships and so forth as you detect a need for them.
4. Restrict yourself in writing policy descriptions to the use of words in your reserved list, Data Dictionary terms and imperative verbs.

If you go about policy descriptions in this way, you will be unable to write anything but legal structured English. It's possible the result may seem a bit stilted and stuffy — if so, go back and relax your vocabulary restrictions to smooth it out. This editing should not affect syntax.

```
POLICY FOR PENDING ACCOUNTS

Repeat the following:
    Access the Customer-Account-Record.
    If Account-Status is Delinquent and Balance is under $1,
        Set Account-Status to Pending.
        Accumulate Account-Balance into Total-Pending.
        Set Date-of-Last-Transaction to Today's-Date.
Until there are no more Customer-Account-Records.
```

Figure 1

```
Policy for Deletion of Suspended Accounts

FOR EACH Customer-Record IN Account-File:
  IF Account-Status EQUAL Suspended,
     IF Todays-Date MINUS Date-of-Last-Transaction EXCEEDS 30,
        THEN,
           Set Account-Status EQUAL Retired.
           Set Date-of-Last-Transaction EQUAL Todays-Date
           Write Customer-Record to History-Log.
           Delete Customer-Record.
```

Figure 2

Structured English's Vocabulary

Why is it that structured English allows you to use any English language verb, but not any noun or adjective? The reason is that verbs simply cannot get you into the kind of trouble that the other words can. More than a century ago, no less an expert on words than Humpty Dumpty made this point:

> **They've a temper, some of them — particularly verbs: they're the proudest — adjectives you can do anything with, but not verbs.**
> — *Through the Looking Glass*

A word "you can do anything with" is obviously not going to be much help in writing specifications. Its great flexibility will only encourage varying interpretations — just what we want to avoid.

Verbs have more intrinsic meaning; that is what makes them prouder (more independent), in Humpty Dumpty's estimation.

Of course, there are some verbs that aren't very proud. The worst of these are the verbs "process" and "handle." While a statement like "Process New-Customer-Update" seemingly qualifies as valid structured English, it doesn't have any meaning. "Process" is a catchall verb that implies the union of all verbs that could ever be associated with the given object.

A rough translation of the statement "Process New-Customer-Update" is the following:

"Do any and/or all of the kinds of things that anyone might ever think of doing to a New-Customer-Update without provoking gales of laughter."

"Handle" is equally bad. I suggest you banish both of these words from your vocabulary.

Words like "edit" and "verify" are weak. You should complement their use with specific edit and verification criteria.

If you had to build a formal specification language, you would have to pick and choose among the adverbs and adjectives of English in an attempt to come up with a minimal set of the strongest words. You might accept words like "zero" and "nonzero" and reject words like "peachy."

For our purpose, however, this has already been done. When we wrote the Data Dictionary definitions for our data elements, we considered all the adjectives that were meaningful to us. These are the value names we used in the definitions.

If we have defined the elements completely and successfully, the set of value names will be entirely sufficient for our purposes. We need not be burdened with a complete general-purpose set of modifiers. The value names constitute a highly orthogonal special-purpose set, tailored to our specific requirements.

Similarly, as part of the process of writing the Data Dictionary, we have

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already selected our required set of nouns. These are the names given to files, data flows and data elements. If our Data Dictionary is complete, we shall need no others. All objects (direct and indirect) of structured English statements will be Data Dictionary-defined names.

In summary, the structured English vocabulary is made up as follows:

- *Verbs* that can be selected from the set of English language transitive verbs minus blatantly meaningless ones such as "process" and "handle."
- *Objects* that must be taken from the set of names given to files, data flows and data elements in the Data Dictionary.
- *Qualifiers* that can be taken from the set of names given to data element values in the Data Dictionary.
- *Conjunctions* (such as "if," "while," "until") that must be taken from the set of reserved words used to effect the three syntactic constructs.
- *Relational attributes* (such as "equal," "and," "or") that must be taken from the set of reserved words.

No other words are considered part of the vocabulary of structured English.

Structured English Styles

When I teach the subject of structured English and its use, I often get questions like:

"What is the list of reserved words?"

"Can you give us a formal language description?"

"Is there a program that will process structured English and verify its correctness?"

"Is there a program that will take structured English as input and generate code?"

I don't have answers for such questions. They all imply a degree of formalism that structured English simply does not possess.

It should be clear from my past examples that structured English is not a rigorous specification language that allows you, effectively, to *code* your requirement. If it were, it would be useless. No analyst is ready for such rigor so early in the project. The last thing we want to do is start coding during the analysis phase.

In the examples presented last week, I did not even try to be consistent in my formats and conventions. On the contrary, I endeavored to show some of the varied approaches that different analysts take to writing structured English. Some like to use a strict indentation convention — others do not indent at all. Some use military numbering schemes or outline format. Still others draw boxes around their building blocks (see Figure 1 for an example) to call the reader's attention to the logical structure.

Your particular approach to structured English is a matter of style. There is one and only one rule which applies: Make it comprehensible and palatable to your user.

Some users are quite content to look at descriptions that border on pseudocode. Others will only look at descriptions that seem to be written in normal text. There is a structured English style to suit each of these extremes.

In selecting a style for use in your own environment, you need to take account of considerations such as:

1. How terse can the descriptions be without scaring off users?
2. What limits and conventions shall apply to nested subpolicies?
3. How can confusion about block boundaries be avoided?

In dealing with these questions, the chief concern must be user characteristics. How much is the user willing to bend toward your methods? How much do you have to disguise your methods to obtain his acceptance?

Abbreviated and Narrative Styles

It is a very rare user who is willing to look at program listings to verify that his requirement is being met. If you are a beginner, this may come as a shock to you. You might assume that users would want to see the actual code, particularly if it were written in some fairly conceptual language such as PL/I or Cobol. After all, that code is the ultimate specification. What a boon to the development process if the user would treat it as a specification rather than insisting on some sugar-coated documentary description.

That line of reasoning is somewhat naive for two reasons: our current compiler languages are not nearly conceptual enough for true specification

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AT&T will conduct a briefing on Advanced Communications Service (ACS) specifically for management consultants specializing in data communications systems.

The purpose of this briefing is to:
- Respond to the inquiries we have received from various consultants;
- Provide data communications consultants with a better understanding of the service;
- Solicit feedback and suggestions regarding satisfying data communications user needs with ACS.

This briefing will be conducted Thursday morning, August 31, 1978, at a Bell System facility in northern New Jersey. This briefing is intended for management consultants specializing in data communications systems. It is not a briefing for users of data communications equipment or software.

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Bell System

work, and the coding process is too time-consuming to suit the iterative exchange of ideas that must take place duing the analysis phase.

More importantly, the thought that the user might be willing to deal with the code does not take into account the kind of person he is. The typical user is far removed from the world of systems development. Anything that happens in the innards of a computer is likely to be too technical for his peace of mind.

Code, no matter what variant of it is used, is a foreign language to him. From his point of view, asking him to read PL/I is as strange as asking him to read Chinese. He can see no benefit in struggling with a foreign language — he is likely to get himself into trouble by agreeing to something that may have disastrous implications and that is beyond his understanding.

There is also the question of territoriality. Why should he go so far into your turf, rather than being met on neutral ground?

For all these reasons, users are likely to be turned off to structured English to the extent that it looks like code or seems to be a tool of system developers. I'll come back later to the question of how you present the concept to your user. Here we will consider only how the appearance of our structured English can be modified to suit the user.

The most abbreviated style of structured English is what you come up with if you strictly adhere to the vocabulary limitations. If you go about composition with the two-step process I introduced earlier, the abbreviated style is your interim product. An example is Figure 2. Again, I have capitalized the reserved words and phrases to help keep track of them.

Of course, your user *could* understand this. The question is, will he be willing to work with it? If you can get him to accept this kind of specification writing, you will save yourself the extra task of revising it to suit him.

If your user is put off by the appearance of the abbreviated format (or if you think he would be), some editing is required. Editing for user acceptance may involve the following:

- Relaxing vocabulary restrictions to add words and phrases that have the effect of smoothing out the description.
- Abandoning capitalization and hyphenation conventions.
- Revising indentation conventions.

The most extreme editing would be for a user who obstinately refused to deal with anything that looked the least bit foreign. Such a user would require you to *disguise* your structured English so that it looked just like narrative text.

As an example, I have taken the same policy you just looked at in the abbreviated format and disguised it. Here it is in Figure 3, masquerading as innocent text description.

This is still structured English. Its syntax conforms rigorously to the building-block constructs. Each sentence object is a Data Dictionary name (although the Data Dictionary entry may be capitalized and hyphenated). All modifiers are data element values.

True, there is some additional verbiage, but that should not get in anyone's way. You could reconstruct the abbreviated format easily enough by crossing out each word that is not part of the restricted vocabulary, capitalizing each word that is in the list of reserved words and rearranging the indentation.

Clearly, there are structured English styles which lie somewhere between the two extremes. Many analysts, for instance, edit to smooth out the description but retain the indentation. I leave it to you to select the middle ground which best suits your environment.

Nesting Subordinate Policies

The human mind deals rather well with the concept of nesting (your mind is doing that right now by reading this parenthetic comment) provided that certain common-sense rules are observed. You can totally frustrate the communication process by nesting too deeply or too often or over too large a span.

You would probably be willing to accept that comment on face value, but I offer an example (an example that will almost certainly (don't ask me how I know) leave you gasping (figuratively) (not literally) for relief (or at least for

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AT&T will conduct a briefing on Advanced Communications Service (ACS) specifically for suppliers of equipment and software that are used for data communications.

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- Present functional specifications on the terminal and host computer protocols that ACS supports;
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the end of the example (which, however (and I use the word ("however") advisedly) will go on and on until you fianlly collapse exhausted)), relief which could only come in the form of a final (and definitive) (but not immediately forthcoming) end to this paragraph (which ought to have served its purpose (whatever that was!) by this time)), anyway.

In structured English, you can expect to get away with rather more nesting than you would in text, provided that you adopt a helpful indentation convention to guide your reader (see next subsection). However, there are still limits.

I offer you my own observation about nesting: two levels are workable, three are marginal, four or more give you an incomprehensible product.

If you encounter a policy that seems to demand more than three levels of nesting, I suggest you try to decompose the primitive — you have stopped your partitioning too soon. Alternatively, you might consider using a Decision Table or Decision Tree instead of structured English.

If your indentation convention causes you to indent for each subordinate level, you will end up with a self-policing standard. By the time you have gone down three levels, there is no inclination to indent further because there wouldn't be enough space left on the line to write anything.

Blocking, Indentation Conventions

In most of the examples I have shown you, there was some obvious relevance to the placement of statements on the page. My approach to this "laying out" of structured English policy description has two goals:

- To delineate the boundaries of adjacent logic blocks.
- To show subordination.

The reason for the first of these goals may not be clear until you see an example — Figure 4 — in which a boundary is obscured. The problem here arises in the last line. It is not clear whether the accumulation of Running-Total applies only to those accounts with a balance of less than $1, only to accounts which are not delinquent (without regard to balance) or to all accounts.

Three Possibilities

Any of the three interpretations is defensible. In order to decide among them, you need to know where the two decision blocks end. It may belabor the point, but let me show you all three possibilities.

The first one, Figure 5, describes a policy in which the Running-Total is accumulated only for accounts of less than $1. That is quite different from Figure 6, which illustrates a policy of accumulating a total to include the balance of all but delinquent accounts. The third possibility, in which the running total is made up of all account balances, is shown in Figure 7.

There are three possible structured English conventions to delineate block boundaries:

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Policy for Deletion of Suspended Accounts

We go through the account file, one customer record at a time. For each customer record, we do these things: First, we ask if it has been marked "Suspended" in the account-status indicator. If so, we ask if the date of the last transaction is more than 30 days before today's date. If that is also true, then we do the following four things: 1. Mark the account status "Retired." 2. Set the date of last transaction to today's date. 3. Write a copy of the customer record to the history log. 4. Delete the customer record from the account file.

Figure 3

An Ambiguous Policy

```
Access the Customer-Account-Record.
If Account-Status is Delinquent,
Write Account-Number to Officer-Action-Report.
Otherwise,
If Account-Balance is less than $1,
Set Account-Status to Pending.
Accumulate Account-Balance into Running Total.
```

Figure 4

The Ambiguous Policy Resolved

```
Access the Customer-Account-Record.
If Account-Status is Delinquent,
   Write Account-Number to Officer-Action-Report.
Otherwise,
   If Account-Balance is less than $1,
      Set-Account-Status to Pending.
      Accumulate Account-Balance into Running-Total.
```

Figure 5

The Ambiguous Policy Resolved Differently

```
Access the Customer-Account-Record.
If Account-Status is Delinquent,
   Write Account-Number to Officer-Action-Report.
Otherwise,
   If Account-Balance is less than $1,
      Set-Account-Status to Pending.
   Accumulate Account-Balance into Running-Total.
```

Figure 6

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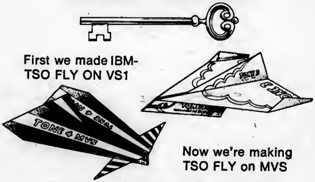

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(Continued from Page 19)

1. Mark the blocks explicitly by drawing boxes around them (as in Figure 1) or by using some specific catch-phrase.

2. Use a military numbering or outline format; resetting the paragraph number shows the end of the block.

3. Use an indentation convention as in the preceding examples.

```
The Ambiguous Policy Resolved a Third Way

Access the Customer-Account-Record.
If Account-Status is Delinquent,
   Write Account-Number to Officer-Action-Report.
Otherwise,
   If Account-Balance is less than $1,
      Set-Account-Status to Pending.
Accumulate Account-Balance into Running-Total.
```

Figure 7

```
A Variation of the Ambiguous Policy Resolved the Third Way

1. Access the Customer-Account-Record.
2. If Account-Status is Delinquent,
      2.1 Write Account-Number to Officer-Action-Report.
   Otherwise,
      2.2 If Account-Balance is less than $1,
         2.2.1 Set-Account-Status to Pending.
3. Accumulate Account-Balance into Running-Total.
```

Figure 8

The second and third of these are the more frequently used. Figure 8 is an example in which an outline-like format helps to resolve the boundaries. Note that the "Otherwise" did not get a new number. Block number 2 is the entire Decision construct, both the If part and the Otherwise part:

Whatever you use for block delineation (indentation, numbers, boxes) will serve to show subordination as well. In the example above, the subordinate policies 2.1 and 2.2 are nested inside the Decision construct of block 2. Both the indentation and numbering scheme used call attention to this nesting.

The Balance Sheet

I sometimes feel that analysts are all extremists on the subject of structured English. There are those who can barely restrain their enthusiasm for this wonder which promises to add some degree of formalism and rigor to the specification process. Then there are those who are unable to consider the topic without audible groans of distress.

Both are extreme. As the soul of unbiased reason and moderation, I have taken it upon myself to set out the balance sheet on structured English:

ADVANTAGES OF STRUCTURED ENGLISH

1. *It survives the life of the project.* During the analysis phase, it can be used to describe policy; during module design, it can be used to describe logic. It may also prove useful for odds and ends of procedure description. Project members who become facile with structured English tend to use it for everything.

2. *It can be kept in automated format.* You can use text editors to keep it up-to-date. It can eventually be included in the listing of some program that implements the policy described. You may even get the maintenance programmer to modify it (since it is staring him in the face) when he makes a required change to the code.

3. *It can be made concise, precise and readable.* Structured English is probably as close as we will ever get to a formal specification language.

4. *It can be tailored to suit the user.* Since our users range in DP sophistication from total novices to computer jocks, it is essential that our specification tools have this flexibility.

5. *It can be coordinated to the Data Dictionary and the Data Flow Diagrams to check consistency.* This is what I call a lexical check.

6. *It can be written quickly and naturally.* Once you have built some facility in structured English composition, it is as simple as any form of writing. Since it is abbreviated and free from considerations of personal style, you will typically spend less time with it than you would with narrative description. This is important since we need to spend as little as possible on each iteration so that we can go through more iterations.

There are some disadvantages, too. I believe they can all be overcome but, just for the record, here they are:

DISADVANTAGES OF STRUCTURED ENGLISH

1. *It takes some time to build structured English skills.* While you are new at it, you may find yourself struggling to distinguish between policy and procedure, struggling to reduce redundancy, struggling to live within the syntax and vocabulary limits — or just plain struggling.

2. *It seems to be more formal than it is.* Structured English is not a formal specification language. It is not rigorous. What it is, is terse. Descriptions written in structured English tend to be simple and easy to read. But there is no guarantee that just because they can be expressed in structured English, they are right.

3. *It can scare off your user.* If you show him a variant that seems too foreign to him, he is liable to become a re-

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actionary. He may refuse to look ever again at anything but Old English script.

Gaining User Acceptance

I once had a student remark that structured English seemed like a great tool for analysts to use among themselves and in communicating with the implementors, but not something to be shown to the user. I came to the melancholy conclusion that I had wasted that student's time.

In my opinion, something you can't show to the user is *totally worthless* as an analysis tool. We have never had an insurmountable communication gap among analysts or among analysts and implementors. But there is a veritable communication chasm between the analyst and the user.

It is this chasm that structured analysis is trying to bridge. In order to be of any use to us during the analysis phase, structured English has got to be made acceptable to the user.

I have made the point above that part of the task of gaining user acceptance involves tailoring your structured English conventions to his tastes and abilities. But presentation of the idea is equally important. A long, pompous memo touting the glories of structured English and ranting on about orthogonality, limited syntax, Bohm and Jacopini constructs and the like is not the way to broach the topic.

Remember, you are not trying to tell the user that specifications will be written in structured English. You are trying to convince him that there is no better way and that he would be crazy to settle for anything less.

Selling the Idea

I offer these points to help you sell this idea:

- Pick your formats first. Don't show him several and ask him to choose. The more abbreviated ones might frighten him, and he might then sense that the others are just disguised versions of the same thing. You have to guess — and guess right! — what will be acceptable to him.
- Let him see you working with structured English before he realizes it will be used in his specification. Let him review your notes. Solicit his observations about various policies written in structured English. By the time you discuss the makeup of the specification, he must already be sold on your descriptive techniques.
- Whatever you do, *don't use any highfalutin' jargon.* Don't even use the term "structured English." If the user asks you what you call your descriptive language, tell him it's called English. Tell him you indent funny. Tell him you have a dull writing style. Tell him you hate adjectives.
- Show it to him a little at a time. Be present when he looks at it. Use a walkthrough to help him along.
- Work with one user at a time. Don't let them gang up on you.

Finally, if you find that you have to retreat from using structured English because your user simply refuses to accept it, don't retreat further than you must. If you can't use structured English, structure your use of English. Use Data Dictionary names wherever you can. Avoid compound sentence structures. Write so as to interrupt the reader's serial thought process as little as possible. Cross out every adverb and adjective that can be deleted without changing the meaning. Use indentation and numbering freely to enhance readability.

I said at the very beginning of this piece that if you partitioned enough, you couldn't get into too much trouble writing your minispecs in narrative text. So if you are reduced to that, don't stop partitioning until your primitives are truly tiny.

If you judge you will never be able to slip structured English past your user and you must rely on text description, then I have some added homework for you. There is one very short and utterly delightful handbook on writing called *The Art of Plain Talk*, by Rudolf Flesch, published by Collier Books in 1946.

Buy a copy and read the first 10 pages — that should be enough to get you hooked. He, too, has tried to settle on a clean and minimized subset of the English language for clear exposition.

His subset is called "plain talk." It is not too different from structured English.

Tom DeMarco is a senior staff consultant with Yourdon, Inc. in New York and is the creator of Yourdon's Structured Analysis and System Specification Workshop and Structured Analysis/Design Workshop. He is also author of a forthcoming seven-part series on structured analysis from Deltak, Inc.

Early in his career, DeMarco worked on the ESS-1 project at Bell Telephone Laboratories. Later, under contract to IBM, he served as manager of an early time-sharing experiment on the then-new IBM 360 system.

In subsequent assignments, DeMarco was responsible for implementing several very large distributed processing systems.

DeMarco holds a B.S. in electrical engineering from Cornell University, an M.S. from Columbia and a Diplome from the University of Paris (Sorbonne).

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Editorial

Crime Center Needs Support

The people drafting and enforcing laws against computer crime, as well as defending individuals accused of such crime, might be seen as involved in an inevitable effort. Their work has been spurred by the accelerating computerization of data base management, accounting and funds transfer processes.

As true pioneers, they do not derive their specialized expertise from universities or professional schools, nor do they usually have much formal training in the technology they address. Instead, they have acquired their expertise the hard way: from practical experience and independent research.

Until now, prosecutors, in particular, have been hampered by the lack of a centralized information clearinghouse to help them research methods and scholarship pertaining to DP crime.

However, a National Computer Crime Data Center established recently in Los Angeles should go a long way toward filling this gap. One objective of the center is to make appropriate information available to all U.S. law enforcement agencies [see article in this issue].

The center will provide "legal work products" such as model search warrants, trial briefs, scholarly articles and bibliographies. It will also offer case summaries and modus operandi germane to known computer crimes; statistical studies of such crimes and their perpetrators; and analyses of "crime problems from ethical, business, security, accounting and computer industry viewpoints."

Furthermore, the center will maintain an up-to-date listing of experts in areas relating to computer crimes, indexed by categories such as the type of crime and the nature of related judicial and ethical problems.

Its interests will also extend to cases of foreign and transborder computer crime.

DP professionals should recognize that the center can provide a valuable service to society in general and their profession in particular. The mounting incidence of computer crime has provoked a need for elaborate security features in system hardware and software that must dampen performance and cost-effectiveness.

Moreover, out of a fear of adverse publicity, businesses and financial institutions that have been victimized by computer crimes have developed a less-than-candid posture toward the press and the public, while passing their monetary losses on to customers in higher prices.

Finally, since government agents can themselves be computer criminals by violating the right to privacy of citizens, prosecutors of such violations, supported by the services of the new center, just might make the critical difference between a climate that fosters totalitarianism and one that forbids it.

"We are here to collect and disseminate information, [but] that is possible only if members of the public, prosecutors' offices, the business, computer, accounting, and security industries contact us," Jay Becker, the center's director, has noted.

Any individual or organization able to contribute information or funds is advised to contact Becker c/o the National Computer Crime Data Center, Room 540, 320 W. Temple St., Los Angeles, Calif. 90012.

Jim Dalton Computerworld
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Letters to the Editor

Condescending Expression

I appreciate *Computerworld*'s coverage of international data transfer as it affects the so-called "less developed countries" (LDCs). However, even though I'm sure CW did not coin the term, I think "less developed countries" is a poorly considered expression.

It's condescending. But then, perhaps all the genuine and not-so-genuine spiritual representatives arriving from the East consider the U.S. and European countries LDCs.

Our work is in fostering technological competence — a psychological problem, not one of technology transfer. We have often found it is an advantage to work with the "less developed" because there are fewer bad habits to dispel.

Anyhow, remember that Japan was once an LDC.

R.M. Wachtel,
President

Occidental Data, Inc.
Occidental, Calif.

How About Microfiche?

Everything stated in the editorial "Difficult, But Necessary" [CW, Aug. 7] is true. However, I think there is an alternative: microfiche.

Microfiche would reduce both paper costs and postage. I know Compu*terworld* is available on microfilm. However, film viewers are less common and more expensive than fiche viewers. Anyone who, like myself, uses IBM's Early Warning already has access to a fiche viewer.

If CW were available on microfiche at a reduced rate, I would take advantage of it.

Richard Clary

Gainesville, Fla.

Spinoff of Proposition 13?

The tax revolt symbolized by Proposition 13 may have the opposite effect on software taxation. California voters for the measure are beginning to believe that "other taxes will be raised to make up the difference," according to a recent survey.

This year, California and Tennessee have enacted tax limitation legislation. At the same time, both states are maintaining the most oppressive — and possibly unconstitutional — software taxation in the country.

California led the nation in the early '70s by taxing virtually all computer input under statutes authorizing a tax on tangible personal property. Several other states (including New York) soon followed.

But in the past few years, intensive industry involvement has shifted the tide. Eight states (Alabama, Florida, Louisiana, Minnesota, New Jersey, New York, Vermont and Wisconsin) have recently created broad exemptions for DPers. Other states are working on such proposals.

Rescinding its software taxation, New York declared the tax unfair to DPers.

While the California example is being largely overturned everywhere but in California itself, Tennessee has embarked on a new example which has yet to be tested. After the Tennessee Supreme Court ruled in 1976 that computer input in the broadest sense is intangible and taxable, the state legislature came back in 1977 and classified the identical computer input tangible and taxable. Will other states follow?

Although our counterparts in the legal profession, accounting and elsewhere are generally exempted under state tax laws, DPers may be forced to shoulder the burden as tax reform fever sweeps the nation. Our strong united voice must be heard now, lest it be drowned in the din of a much larger tax revolt.

Robert M. Sherin

Miami, Fla.

Data Past

Five Years Ago
Aug. 22, 1973

LANCASTER, Pa. — Armstrong Cork turned out to be a highly successful test site for IBM's DOS/VS when it enabled the company to reduce its workweek from six to five days. "We expected it to be good, but, quite frankly, not as good as it is," Charles Letteer, Armstrong's manager of computer systems, said.

— — —

PROVIDENCE, R.I. About 45 government programmers and keypunch operators here took part in a wildcat three-day "sickout" to protest a lack of advancement opportunities for programmers and to get action on a pay-step increase.

Eight Years Ago
Aug. 26, 1970

NEW YORK — Half of the commercial antitrust plaintiffs dropped their cases against IBM, with varying effects on at least three software products. The move left IBM free to resume the distribution of its Computer Remote Job Entry (CRJE) program to its time-sharing customers, leaving Applied Data Research, Inc. undecided as to whether it would continue to sell its Roscoe program in competition with the free CRJE. Still in question was the destiny of Autoflow, a patented program which tested, debugged and flowcharted users' software.

The Human Connection

Users See Wider Role for Systems Vendors

By Jack Stone
Special to CW

I suppose we all enjoy poking a little fun at our vendors. Certainly the new breed of vendors playing the microsystems game offers a joyful target as it lollygags about in the marketplace.

For this week's column, I thought it would be useful to describe to new systems vendors on the block (and, hopefully, refresh the memories of some of the old codgers) my 10-point program of systems selling. According to this, the successful systems salesperson must perform — in consort with the vendor organization — 10 different roles at appropriate times to meet the system buyer's full expectations of sales performance.

I found this program very useful to my marketing students and hope it will be helpful to the readership as well.

Here is a brief description of these 10 roles:

- Experienced problem solver. Regardless of the size of the organization, the management information systems (MIS) director feels the complexity of the problems requires complex solutions. The director wants to deal with a vendor who can assist in all aspects of the solution, not just in hardware selection but also in systems analysis, systems design, management, operations and training.
- Effective salesperson. The MIS director wants to be sold. Specifically, the vendor is expected to properly describe the business needs of the customer organization for new or improved information systems, recommend a practical solution and present a cost/benefit justification for the recommended solution.
- Industry specialist. The MIS director wants the vendor to have reasonable knowledge and experience in working in his industry segment to provide additional assurance of the quality of the vendor's work. He further expects the vendor to bring current information to him on progress and developments in information systems applications within the industry.
- Technical expert. The MIS director views the systems vendor as a leader of technology development. The director expects vendor support in the form of knowledgeable people at the local level, with proper backup at district and regional levels.
- Skilled trainer. The MIS director assumes the vendor will supply training in system concepts, design, management and operations for each segment of the customer organization, appropriate to its needs.
- Practical long-range planner. The MIS director depends on the vendor to provide assistance in developing long-range implementation plans that provide controlled growth of system capabilities without significant impact on current operations.
- Professional businessperson. The MIS director prefers to deal with a business professional. He seeks one who represents a company which (ideally) specifies product, price, delivery and terms and conditions which are easy to understand; never promises what it cannot deliver; and always delivers on a commitment.
- Responsive serviceperson. The MIS director expects to have maintenance problems handled in a prompt, effective and orderly manner and looks to the sales rep to ensure such handling.
- Project manager. The MIS director recognizes the successful delivery, installation and support of a system depends on the careful orchestration of the efforts of many people from the vendor organization. This requires the efforts of a qualified project manager.
- Team player. The MIS director views his vendor as a key member of his operating team, one who meets both the letter of their business agreements and its spirit.

No system can be successfully installed without trust and confidence between customer and vendor. But no written agreement can guarantee such a relationship. Instead, it will — and must — naturally evolve as both sides work together and observe the other doing the job in a responsible way.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

Reader Commentary

Rapid Industry Change Brings Advances, Snags

By Jim Ryan
Special to CW

Now that the 1977-78 season of seminars and conventions has come to a close, it's time for the old-time user to try to take an unbiased view of what's happening to computers.

The first and obvious conclusion is that the high rate of technological improvements which prevailed in previous years has intensified. Because of these changes, it is now possible to buy or rent a system which provides much more information service at a far lower cost than was possible two or three years ago. This condition contrasts with the rampant inflation taking place in most other industries.

The only problem seems to be that the user has so many choices of systems, it is hard to decide which one is best. In addition, there is even more confusion caused by the obsolescence rate of the new devices. They seem to be obsolete before the manufacturer produces them.

When the user gets down to specifics in designing a system, the first problem which must be solved is information processing distribution. Should processing be done at one location or at a number of different locations? This problem is relatively new and it was not resolved last year. Every indication is that this problem will become more complex in coming years as miniaturization makes distribution more feasible.

My guess is that it will not be resolved until a super genius, to be known as a management systems planner, arrives on the scene. The management systems planner will be an executive first and an expert computer systems designer second.

Set Objective

In the meantime, for data processing planners, designers and managers, a small word of advice. If you wish to succeed, make your objective to solve the user's problems, not your own; they may not be the same.

If we get past the distribution problem, then it's into the input, output, storage and processing stages. Here we find a need for real talent. Rare indeed is the user or computer systems planner who can thoroughly and efficiently coordinate all of the stages. Even more scarce is the user or planner who can combine all of the stages into a true reflection of the user's application.

There is also some danger that a very persuasive systems planner may take over the administration of the user's business to the user's sorrow. Events of the past year have not minimized this problem. As a matter of fact, they have increased the need for talent at the systems planner level.

Moving onward, we must look at hardware and software. This

(Continued on Page 24)

The Taylor Report

Good Input Can Result In Erroneous Messages

By Alan Taylor
Special to CW

The accompanying printout recommending Matsushita Electric Industrial Co. Ltd. stock as still an attractive buy in the opinion of one Tokyo representative for Merrill Lynch Pierce Fenner & Smith, Inc. was produced Aug. 4 at Merrill Lynch. It is a very interesting example of what not to do when setting up computer networks.

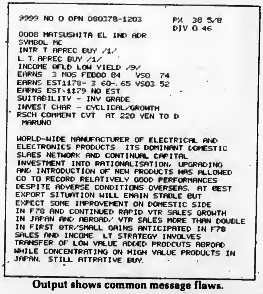
First of all, the facts. The representative had not gone to sleep at the switch. He knew the value of the yen had changed drastically during the three weeks prior to Aug. 3 and that this would seriously hurt the prospects of Matsushita exports. Moreover, he knew he could not be held responsible for predicting the future value of the yen vs. dollar and that he could use this lack of knowledge to his advantage. However, upon reviewing the printout on Aug. 5, the representative himself agreed the opportunity was no longer attractive.

From a systems point of view, therefore, good input was available, but the output was bad. Why?

The problem starts in the upper right-hand corner of the output. Here is a little note, "PX 38 5/8." This, in fact, is a dating indication. It is the last night's close of the stock on the New York Stock Exchange. So, the message was in fact composed as a complete unit, after Aug. 3. To a reader, it would appear to be an Aug. 3 message. (See upper left corner of printout: 080378-1203). However, the yen already had changed and affected the validity of the recommendation long before Aug. 3.

The computer, from two accurate

(Continued on Page 24)



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9999 NO 0 OPN 080378-1203          PX  38 5/8
                                   DIV 0.46
0008 MATSUSHITA EL IND ADR
SYMBOL MC
INTR T APREC BUY /1/
L. T. APREC BUY /1/
INCOME QFLD LOW YIELD /9/
EARNS  3 MOS FEB00 84   VS0  74
EARNS EST1178- 3 60-.65 VS03 52
EARNS EST\1179 NO EST
SUITABILITY - INV GRADE
INVEST CHAR - CYCLICAL/GROWTH
RSCH COMMENT CVT  AT 220 YEN TO D
 MARUNO

WOPLD-WIDE MANUFACTURER OF ELECTRICAL AND
ELECTRONICS PRODUCTS  ITS DOMINANT DOMESTIC
SLAES NETWORK AND CONTINUAL CAPITAL
INVESTMENT INTO RATIONALISATION, UPGRADING
AND INTRODUCTION OF NEW PRODUCTS HAS ALLOWED
CO TO RECORD RELATIVELY GOOD PERFORMANCES
DESPITE ADVERSE CONDITIONS OVERSEAS.  AT BEST
EXPORT SITUATION WILL EMAIN STABLE BUT
EXPECT SOME IMPROVEMENT ON DOMESTIC SIDE
IN F78 AND CONTINUED RAPID VTR SALES GROWTH
IN JAPAN AND ABROAD/ VTR SALES MORE THAN DOUBLE
IN FIRST QTR/SMALL GAINS ANTICIPATED IN F78
SALES AND INCOME  LT STRATEGY INVOLVES
TRANSFER OF LOW VALUE ADDED PRODCUTS ABROAD
WHILE CONCENTRATING ON HIGH VALUE PRODUCTS IN
JAPAN.  STILL ATTRATIVE BUY.
```

Output shows common message flaws.

Users Can Expect Rapid Changes Ahead

(Continued from Page 23)

last year, complexity in these areas has definitely increased because of the multitude of possible variations now available. One trend seems to be that hardware and software are increasingly being sold as a package. This trend is in the right direction because if properly coordinated, it becomes part of the ultimate systems plan.

Application Concerns

After pondering the hardware-software problem, we next attack the application portion of the job. Just to add more flavor to the discussion, many will argue that we should start with the application and work toward hardware and software. The probable truth is constant interplay exists between all sections of the system.

In any case, the application portion requires the wisdom of Solomon because now there must be extremely close communication between the user and the systems planner. In the ideal case, both parties will have established a large common base of knowledge from which they can develop a workable system. Once again, last year's progress did little to minimize this problem.

After the system has been planned and designed, we must still consider installation, operation, maintenance and obsolescence. The entire system can break down because of failure in any one of these areas.

Obsolescence, for example, is of primary importance in view of last year's advances in technology. It is appropriate that old-timers are very much aware of obsolescence because they have found it most important in the past. The young have a tendency to think of their present accomplishments as permanent because they have never had the sad experience of tearing down a system they built.

The new management systems planner will have to be constantly making old systems compatible with the new devices if the most efficient and most economical systems of the future are to be provided. It's a far cry from the days when a computer system meant IBM in a bundled package.

If all of this churning is to take place, the following quote from that old-time solid citizen Harry S. Truman appears to be appropriate now. "If you can't stand the heat, stay out of the kitchen." My safe projection: The next year in the computer industry is going to be a hot one. Try to stay out of the kitchen!

Ryon is a retired DP user.

Output Shows Poor Practices

(Continued from Page 23)

pieces of information, had produced a false conclusion — that the recommendation was intended to apply after Aug. 3. But it wasn't. It only appeared so from the output because the DP people had merged a pseudo-date with an outdated message. A poor practice — and one to be avoided.

It is very easy to begin a response with a pseudo-date. It may start, for example:

"Dear Mr. Smith, After reviewing your question regarding your wilting tomatoes, we think that you should put quinine on them."

But the phrase "after reviewing" is dangerous pseudo-dating, (particularly for a corporation like Merrill Lynch which could be faced with a suit for false information if anyone relied on the pseudo-dated message).

The correct phrase, unless the program is to be changed, should be as follows (using the tomato case):

"Dear Mr. Smith, Your question indicates that your tomato plants have wilted. The standard treatment we recommend for wilting tomatoes is to put quinine on them."

Not such good public relations — but accurate.

It is fairly certain if you reword the representative's item, you won't come up with the last words of his message, "Still Attrative Buy" (sic). The word "still," like others such as "now" and "present day," effectively certify the message has eternal verity!

Using any of these misleading phrases on an essentially undated piece of prose is ridiculous.

The same last phrase of the computer printout shows another important fact: no one at Merrill Lynch takes the information seriously enough to check it. The spelling "attrative" is one example.

There are also several other misspellings in this short message. It could have been a printer problem, but I don't think so.

However, the three major faults — pseudo-updating, implied certified updating and unchecked messages — are far too common in our systems. How they can be avoided and how easily message networks can be technically improved will be the subject of another Taylor Report.

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Matching '77 Specs

Fortran Extended by Interdata . . .

OCEANPORT, N.J.— The Fortran VII package, introduced 10 days ago by Interdata for use on its larger 32-bit minicomputers, is a globally optimizing compiler with what a spokesman described as a "comprehensive suite of support software."

The compiler provides many of the features of the 1977 American National Standard for the language as well as a number of extensions to provide increased programmer convenience and allow the system to take advantage of the 32-bit architecture, he said.

Clearly intended as an upgrade path for users already working on Interdata equipment, Fortran VII is also helpful to users converting from more costly mainframe equipment, he continued, noting that many of the extensions are comparable to those in IBM's Fortran H compiler.

Interdata's compiler optimizes globally across the entire program module and generates an equivalent — but generally faster and smaller — representation of the original program. It analyzes all flow paths through the user program to ensure program integrity, the spokesman stated.

Among the machine-independent global optimizations performed by Fortran VII are constant computation, constant propagation, symbolic arithmetic and type conversion, he said.

Machine-independent optimizations such as global register allocation and instruction strength reduction combine with the system's optimum choice of machine instructions to ensure that Fortran VII's object code makes best use of Interdata's 32-bit processing capabilities, the spokesman claimed.

Fortran VII programs are augmented by a runtime library with mathematical functions, language extension subroutines, real-time extensions for multitasking and file access and I/O support, he continued.

Development support promotes fast implementation, testing and debugging of modules and systems, he claimed. The environment is provided by OS/32 MTM, Interdata's multiterminal time-sharing system.

The compiler has achieved speeds in excess of 1,000 line/-min, moving from source directly into linkable object code. Programs can be compiled, linked, loaded and executed with a single command, he said.

Fortran VII requires 384K bytes of memory; Interdata recommends a 512K configuration which will support 16 interactive users and enables batch operation of the optimizer.

Since the optimization does impose some overhead, it can be turned on or off by the operator to suit current needs.

The Fortran VII package is distributed on magnetic tape and disk, under license, for $5,000, from 2 Crescent Place, Oceanport, N.J. 07757.

. . . And Added to Tandem

CUPERTINO, Calif. — A Fortran compiler, described as conforming to the full ANS Fortran 77 specifications, has been announced by Tandem Computers, Inc., for use with its T-16 Nonstop multiprocessing systems.

The new language release makes full use of Tandem's existing software environment, which is built around the Guardian operating system and the Inscribe data base record manager, including a multikey access and file locking, according to a spokesman.

Availability of Fortran — "especially a version that conforms with the current standard" — makes the T-16 systems much more practical tools than they had been for engineers and process control applications, he added.

The language provides record structures for data definition language compatibility. The software can also utilize facilities for communications between programs running in the system, reentrant code, virtual memory and concurrent record access, the spokesman continued.

Tandem's Fortran is also capable of running in a multiple language environment, such as with the Cobol introduced by the vendor last year, so that users have the freedom to express their application logic in the form that seems most convenient or efficient, he said.

The compiler and its companion runtime system also incorporate a checkpoint facility so program status and memory contents are passed periodically, on operator command, to a backup processor for protection against unexpected system failure.

The spokesman suggested that the existence of Fortran should lead to the use of T-16 systems in power network management, engineering laboratories and design and development efforts where the capabilities of Fortran are virtually required in addition to the hardware's ability to handle multiple terminals.

The software is said to be friendly to the user, allowing 255 keys to access records as well as the option of exact, partial or generic matches to the search argument. This could be extremely useful in the event an operator is searching a file based on a telephoned request.

The compiler costs $6,000. Microcode to support execution of Fortran programs costs $500 for each of the Tandem processors on which it is installed. Microcode for floating point work, also required for execution; costs $1,500 per processor.

Tandem is at 19333 Vallco Parkway, Cupertino, Calif. 95014.

'Faver' Handles Vsam Files

COLUMBUS, Ohio — Described as a high-performance dump/restore utility designed expressly for the intricacies and logical relationships of IBM's Vsam files, the Fast Virtual Export/Restore (Faver) package is available for DOS/VS users from Goal Systems Corp.

With this software, Vsam clusters (data sets or files) may be exported (dumped) from disk to tape or restored by catalog, volume or individual cluster name, a spokesman said. Selected clusters can even be identified with generic or partial names so that a related group can be handled through one instruction, he said.

The dump program posts pertinent catalog information on the backup tape to allow the restoration — including all delete/define operations — to be totally under control of Faver.

Vsam structure testing is incorporated in order to identify damaged clusters while a compare feature assures a readable tape and an accurate backup by performing a byte-by-byte comparison of the tape and the clusters just "exported," he continued.

The restore optionally allows the automatic cluster definition normally provided by Vsam to be bypassed and a previously defined or reusable cluster to be used in its stead. A user exit can be used to direct Faver to delete, modify or insert records, the spokesman added.

The cluster's name, expiration date, space allocation and volume serial number may be overridden during the restore, he said, suggesting that a data set — renamed, if necessary — could be restored, for example, to a totally different kind of disk than the one on which it originally resided.

All cluster types and file organizations are supported and "export" tapes are said to be device- and catalog-independent.

Faver is currently available for DOS/VS at costs ranging from $60/mo to $1,944 for a three-year lease.

Goal Systems can be reached through P.O. Box 29481, Columbus, Ohio 43229.

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Measurements, Traces Part of Debug Package

ALBANY, N.Y. — A software development package that is said to combine the debugging techniques of dynamic snapshot dumps, interrupt interception, tracing, temporary code replacement and execution frequency measurement has been upgraded by Computer Linguistics, Inc., according to a spokesman.

CLIdebug was designed for users of IBM 360/370 Assembly language programs running under OS or VS. The package, using 22K of memory, allows the user to observe a program in action and requires no permanent alteration of the programs being tested, the spokesman claimed.

All program interrupts are intercepted and analyzed and real execution frequencies of critical loops are monitored and displayed, allowing optimization of production programs under real operating conditions.

An additional feature of CLIdebug is externally provoked instruction-by-instruction tracing. Associated register and memory locations are displayed both before and after instruction execution, the spokesman continued, along with the instruction address and decoded instruction.

Tracing can also be terminated by execution of a selected instruction or after a specified number of instructions have been tracted. This feature is reportedly useful for pinpointing the exact causes of programming problems.

The debugging package, although primarily intended for Assembly language programs, can also be applied to programs in high-level languages including Fortran, Cobol and PL/I.

The object code for CLIdebug, including installation and maintenance, costs $300/mo. The system's source code will also be provided for a one-time fee of $7,500.

Computer Linguistics, Inc. is at 26 Computer Drive East, Albany, N.Y. 12205.

Business-Oriented 'C-For' Extends DG's Fortran 5

VANCOUVER, B.C. — C-For from Finning Computer Services Ltd. is a structured business-oriented programming language designed to augment the powerful computational features of Data General Corp.'s high-performance Fortran 5 on Eclipse systems.

Described as a superset of Fortran 5, C-For is "ideal" for interactive transaction-driven inquiry/response and processing applications, a Finning spokesman asserted.

Running under RDOS or DG's Infos data management system, C-For is implemented as a preprocessor generating fast-executing Fortran 5 code which may be reentrant, recursive or multitasking or a combination of these characteristics.

The software also supports Field Variable data types which enable the user to direct sophisticated string handling with functions such as move with justification, type conversion, edit and "unedit" and field conversion to and from Fortran 5 data types, the spokesman continued.

The problem of numeric precision common to the business community is also addressed with the Field Variable support yielding 15 digits of accuracy, he claimed.

Input source code may be free-form, making preparation easier, and it may include logical control constructs such as IF . . . ELSE . . . UNLESS . . . ELSE . . . , REPEAT . . . UNTIL, WHILE . . . and FOR . . . WHILE . . . STEP . . . , making the purpose of the code more intelligible. The compiler also has substitution macros and a file INCLUDE facility that provide additional capacity for modular, parameterized programming, he said.

C-For is available under license on 800 bit/in. magnetic tape for use on any Eclipse processor, although use of the Field Variables requires a commercial-version CPU. The C-For compiler costs $3,000, while the run-time support costs an additional $2,000.

Finning is at 555 Great Northern Way, Vancouver, B.C. V5T 1E2, Canada.

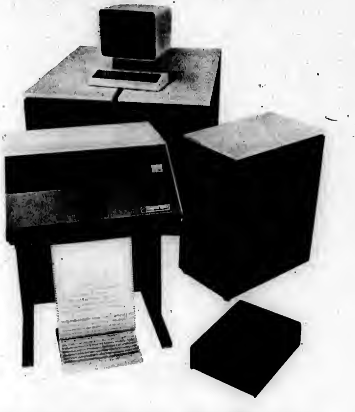
Checklist Eases Contract Review

NEW YORK — Software package contracts must be tailored to specific user and vendor situations, according to a spokesman for Brandon Consulting Group, Inc., which has just published a free *Checklist for a Software Package Contract* to help users gain a better appreciation of the situation they face.

The checklist contains more than 100 items that should be considered including, for example, rights to future enhancements, price protection, freedom of use and the user's right to modify the package. Other items are source code access, title transfer and installation responsibility, the spokesman noted.

The checklist is available on request from Brandon Consulting Group, 505 Madison Ave., New York, N.Y. 10022.

Computer Optics announces a new 3270 feature.



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Not So Mini Anymore — Part 5

Search for Accuracy Shows CPU's Limitations

This article departs from the general pattern set by others in this series to present a picture of the problems encountered in obtaining numerical accuracy.

By Chris Henrich
Special to CW

How accurate are the results of your computer programs? Mathematicians and software designers working for computer manufacturers face this question all the time. Nowhere is the problem of mathematical precision more important than in a language like Fortran, which has become one of the primary computer tools of mathematical and scientific end users.

At the Interdata division of Perkin-Elmer, we have been engaged in a continuing effort to improve the quality of our software. The National Bureau of Standards (NBS) has been interested in problems of accuracy in numerical analysis and in developing methods to measure this kind of quality of mathematical software.

In the course of this work, we learned a great deal about the limitations of any computer and the complexities of programming systems. In studying the accuracy of a "real" function like SIN, it is easy to get startling results. For instance, the programmer knows that SIN takes as its argument an angle measured in radians; and he knows that the sine of *pi* radians is zero; and he knows that *pi* = 3.1416. To be very scientific about it, he expresses this number as 0.31416E01. He expects that SIN (0.31416E01) will be 0.

He will be disappointed. Whatever the computer returns as a result, it will certainly not be zero. It is more likely to be something like 0.7001561E-05.

What's going on here? Is the SIN program in the computer's library inaccurate? No, not necessarily. To be sure what this paradoxical answer really says about the SIN program, we have to keep three things in mind:

- .31416E01 is not *pi*.
- The SIN program in the library never actually sees .31416E01.
- The function SIN is not identical with "sine."

Only the last of these really has to do with the accuracy of SIN. What do the other two mean?

'Real' Numbers

In the first one, the user is up against the fact that what is called a "real" number in Fortran programming really only represents a number of some finite precision. Different schemes are used by different manufacturers, but they all have in common that a real number is represented as an integer, multiplied or divided by some power of a base.

The scientific notation for real numbers implies that the base is 10; thus, .31416E01 means the same as 31416.0E-04, or the integer 31416 times 10**(1/4). If we are using base 10 and five significant digits, as in the example, then the next smaller number we can express is 31415 times 10**(1/4).

This step is "granularity" of our representation of real numbers. If we want to represent a number which falls between 31416E-04 and 31415E-04, then we must be satisfied with a small error or use more digits. As it happens,

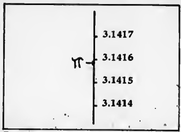

Figure 1. Comparison of *Pi* With Four-Place Decimal Numbers

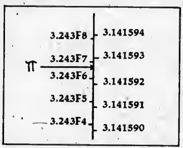

Figure 2. Comparison of *Pi* With Six-Place Decimal Scale (Right) and Five-Place Hexadecimal Scale (Left)

pi is not going to be exactly representable by any number of digits, in any rational base. Figure 1 is a graphical representation of how *pi* relates to nearby numbers with four decimal digits.

The user might say at this point, "Okay, I realize 3.1416 is not exactly *pi*. Still, it is the best approximation with that number of digits. Now what is all this stuff about the computer never really seeing my 3.1416?"

What this means is usually the computer's representation of a real number does not use base 10, but most likely base two, eight or 16. Therefore, after the digits 3, 1, 4, 1, 6 and the exponent have been read in, some conversion routine has to find the nearest real number in the machine-representable set to the decimal number the user specified.

The numbers which can be exactly represented with a given number of digits and a given base are like the little lines on a ruler. The distance between them ios the granularity. Two different bases will be like two different units of measurement; the little lines will not line up.

Figure 2 shows some of the numbers near *pi* on a hexadecimal ruler with six hexadecimal digits and a decimal ruler with seven digits. (Note that the hexadecimal digits run from "0" to "9" and then "A" to "F.") The task of conversion from one base to another is to go from a point on one of these rulers to the nearest point on the other.

Sine vs. SIN

Now we come to the crucial point, which is the difference between the mathematical sine and the program SIN. The writer of SIN and the related programs has the duty to make this difference small, while not losing efficiency in size or speed. In our cooperative effort with the National Bureau of Standards (NBS), one major goal was to make the difference as small as possible.

The first step in such a project must be to have a library of programs that are good enough to criticize. Today, this is easy to achieve.

For instance, the SIN and COS functions are related to each other; in both of them, you can use properties of the mathematical functions to reduce the argument to a limited range. In that range, you can approximate sine and cosine by polynomials.

The theory of getting the best approximation of this sort is well developed. Better yet, there are extensive tables of coefficients for best approximations, to lots of different functions over lots of different ranges.

The next step had mathematicians from Perkin-Elmer and the NBS working together to test the weak points in these algorithms. Possible weakness points are places where the use of one approximation leaves off and another begins; powers of two; and numbers quite close to powers of two.

Extreme values of the argument, where the function may break down, and arguments where the function value is close to zero are also potential weak spots.

When we generated test values, we took care to avoid getting distracted by errors of data-conversion. That meant that we had to control the machine representation of the test values. Each test argument was generated as a

(Continued on Page 28)

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CPU Limitations Seen in Search for Accuracy

(Continued from Page 27)

machine-representable number. Treating this number as an exact real number, we found the function value that corresponded.

As a rule, this value lies between two machine-representable numbers. Either one of them was considered a satisfactory representation of the value. Having obtained these values, we compared them with the values produced by the library program we were testing.

Comparison by 'Granules'

The comparison was measured in what we have come to call "granules," that is, the number of granularity steps between our values and the values produced by the NBS. If the difference was no more than one granule, we felt that this was essential agreement.

A difference of less than 16 granules was considered satisfactory, though not delightful. (Our expectations rose as the project went on.)

A satisfactory algorithm gets an answer within 16 granules of the correct answer for all values of the argument, and the test values were chosen to search out any weak spots.

We did find some weak spots. They were different for different functions, and the nature of the weaknesses was sometimes quite technical. We learned to be eternally wary of the fine points of machine arithmetic: there are things that are not mentioned very prominently in the textbooks but will make trouble for you if you are not careful.

The example of SIN (3.1416) conceals one of these fine points. The argument is indeed close to *pi*; a typical algorithm might involve subtracting *pi* and evaluating the sine of the difference. But remember, *pi* is not exactly machine-representable. The constant you subtract is only very close to *pi*.

In the difference, there is some error. It is small by comparision with 3.1416. But the difference itself is small, so the error is, relatively, quite large. In consequence the computed value of the sine is inaccurate.

Whenever we found such a weak spot, we went back and strengthened the program. One reason for confidence in this process is that whenever the tests registered large errors, we did find a way to improve the program, and improving the program led to better results. At no time did we have to do anything against our mathematical conscience.

Nor did we have to sacrifice speed to get accuracy. This was a surprise; we had thought at first that there would be a great gulf between "quick and dirty" algorithms and "slow but accurate" ones. Actually, to get any kind of useful answer at all, say even within 1%, takes almost as long as getting a very accurate answer. This is one more application of the principle that doing the job poorly is just as hard as doing it well.

Henrich is senior member of the technical staff for software development at Interdata.

ANS Unit Asks Help

WASHINGTON, D.C. — The American National Standards technical committee X3H1, formed to draft a standard for operting system command and response langauges that might begin to bridge the gap between what are now incompatible systems, is seeking help from users and DP professionals, according to chairwoman Lois Frampton of Digital Equipment Corp.

User requirements, functional specifications and design criteria documetns are currently being prepared before the group begins the actual language design work itself, she said.

Meetings Set

The committee, which meets about every eight weeks, has already had three meetings, Frampton noted, adding that future meeting dates are Sept. 18-19 in Montreal; Nov. 6-8 in Phoenix, Ariz.; and Jan. 15-17 in Berkeley, Calif.

Further information is available from Frampton at DEC, ML5-5/E76, 146 Main St., Maynard, Mass. 01754 or from Dennis Hall, 50B-3224, Lawrence Berkeley Laboratories, Berkeley, Calif. 94720.

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With the help of a high-speed microprocessor, Hewlett-Packard combines exceptional performance and convenience in a new low-cost printer and printing terminal.

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High-speed slew for columnar data. When the microprocessor senses more than ten blanks in a row, it slews the print head at 45 inches per second to the next print position.

Three ways to print. The Character Compress/Expand Modes let you print more data on a page and emphasize points with headlines and titles. You can get as many as 132 characters on an 8-inch line, or 227 on a 14-inch line.

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Programmably interchangeable character sets. The HP 2631 can be made to print alternate character sets without reconfiguring the printer.

Long lasting, quick change print head saves service calls. The 9 wire print head is conservatively rated at a 100 million character life-span. It's also self-aligning. When you finally replace the head, you can do it yourself in a couple of minutes.

Long-life cartridge ribbon for a clean change. With a life span of at least 10 million characters, this innovative drop-in cartridge takes the mess and trouble out of ribbon changes.

Self-test for quick status checks. One key tells you if the printer is ready to go. If it isn't, the self-test feature helps you isolate the problem, reducing the time and cost for repairs.

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Working From User Tapes

Service Supports High-Quality Printed Output

RICHMOND, Va. — A service for installations in need of high-quality printed output, especially if it must be distributed to multiple locations, is being offered by Southeast Composition Services.

The Printran service utilizes a photocomposition system including an electronic character generation facility to produce a print-quality plate for each page of the user's output. The service does not include printing of the output; the plates and the original magnetic tape input are returned to the user, a spokesman explained.

The electronic character generation means the system actually produces new characters, in print-quality fonts, from the bit patterns that represent the characters on the user's tape. Printran does not just make a plate after photographing conventional computer line printer output, he emphasized.

Printran provides the user-client with several options including margin justification; proportional spacing of characters (in contrast to the "mono-spacing" normally provided by line printers); and the ability to increase or decrease the size of individual characters, words or numeric fields for emphasis, the spokesman noted.

The print file — which may be on either 800- or 1,600 bit/in. magnetic tape — is typically created at the user's shop, assuming it is IBM-oriented, by designating a tape drive as the SYSLIST device, he said.

There is no requirement that the tape come from an IBM system, however, the spokesman continued. There must be a carriage control character in the first position of each print line, but that character and the material to be printed may be in either Ascii or Ebcdic form. In other words, the system can accept output from virtually any CPU that has a tape capability, he said.

The vendor normally is able to produce the plates and have them with the original tape file, on their way back to the client within 24 hours of when the tape is received, he claimed.

Cost of the service varies from $1.25- to $3/page depending on the number of pages composed. There is an extra charge if the user wants the output "jazzed up" a bit. In any case, there is a $50 minimum per job, he said.

Southeast Composition Services is at 301 Grace St., Richmond, Va. 23219.

Security Added To Tape System

SAN MATEO, Calif. — Security/password protection has been added to Epat, the tape library management system from SDI. Users can restrict maintenance and access to the Epat Master Catalog by using any desired algorithm, a spokesman claimed.

Epat allows the user to store multi-level access codes on a disk record embedded in the master catalog, he said. The record is made available to the security/password routine each time a maintenance request is made, but it can't be accessed any other way.

SDI can be reached through P.O. Box 5801, San Mateo, Calif. 94402.

Seminar Set

LEXINGTON, Mass. — A three-day seminar on improving manufacturing information systems with current production and inventory control techniques will be held Oct. 4-6 here in this Boston suburb.

Entitled "Releasing the Basics — Key to System Success," the course will be taught by Charles G. Andrew, professor of management at the University of Hartford (Conn.), and will include lectures, discussions and workshops.

Registration fee is $350, according to the sponsors at Mitrol, Inc., 1050 Waltham St., Lexington, Mass. 02173.

On-Line Data Entry Extends Payables System

WOODLAND HILLS, Calif. — Twelve CRT screen formats make up the backbone of an on-line data entry/validation capability just announced by Informatics for use with its Accounting IV/Accounts Payable System.

The separately priced option enables users to enter accounts payable data directly into the system using IBM's CICS software and 3270 or compatible terminals. The screens support vendor and voucher information as well as master file transactions, a spokesman noted.

The accounts payable system itself has been described as capable of handling several companies and processing all combinations of automatic payment, cash accounting and accrual accounting methods in one execution.

With the on-line data entry facility, integrity of the files is established through passwords. The edit routines validate individual entries and balance to control figures before posting accepted transactions. That reduces the risk of lost discounts and "virtually eliminates" the possibility of paying the wrong vendor, according to the firm.

Even beyond its internal logic, the on-line front end enables a company to manage its cash position more easily than it could in batch mode because the accounts payable liability can be established, prompted and referenced easily, the spokesman asserted.

Written in ANS Cobol and designed to run under DOS or OS with CICS release 1.3 on IBM 370 equipment, the on-line data entry/validation routine costs $5,000.

The Accounting IV/Accounts Payable package (also in ANS Cobol) costs $15,000, Informatics said from 21031 Vanowen St., Woodland Hills, Calif. 91364.

Datapoint Units Support Doctor, Clinic Billings

N. HOLLYWOOD, Calif. — An on-line, interactive system for patient billing and insurance form preparation is now available from Occidental Computer Systems, Inc. for use under Datashare on Datapoint Corp. 5500 or 6600 units.

The system is said to develop a comprehensive data base for the patient master and transaction history files. Though the system supports current use by several doctors' offices or clinics, each patient file is protected against access by unauthorized users, a spokesman stressed.

The system is controlled by a series of parameter files — called profiles — which allow each user to tailor the available options to its particular requirements. Account retention, delinquency control, statement and insurance form preparation and financial reporting structure ~~are~~ all managed through profiles, the spokesman noted.

Each user may create its own fee schedule and procedure file and have its own file for diagnoses, revenue centers and insurance companies as well as recall messages, he continued.

Reports available through menu selection include account aging, collection lists, account balances, charge and receipt journals, daily and monthly receivables recaps and patient statements.

Written in RPG-II and Datapoint's Databus, the software will typically run on a Datapoint 5500 or 6600 with three CRT units, 20M bytes of disk space and a 300 line/min printer, he added.

The billing system can be acquired for $12,600 from Occidental at 10202 Riverside Drive, N. Hollywood, Calif. 91603.

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General Credit Manager
Rohm and Haas Company
Philadelphia, Pennsylvania

Those words, from Mr. Donald R. Stoll, frame an important facet of the Fortex business philosophy. It emphasizes our dedication to system quality, design simplicity and functional output; factors inherent in all Fortex software products.

This particular Fortex system was designed and installed with the total commitment and involvement of the Rohm and Haas MIS personnel and the user group. As a result, said Mr. Stoll, "The CRT's lit up and the system went live in half the time, at half the cost of an in-house program. Because the software package was installed earlier and at lower cost than an in-house system, the payback was greater, and started earlier."

Another extra value of Fortex products is our system simplicity. In this installation it was necessary that end users could obtain and enter information easily, without being aware of the computer's needs. The Fortex C- ARMS system fulfilled that requirement.

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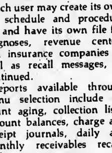

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X.25-Compatible Software Developing

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. – The adoption of X.25 as a standard protocol for public data networks will soon foster the introduction of compatible software interfaces.

Although a few of the interfaces have already been announced, more than 130 software developers are known to be developing X.25-compatible products.

After the standard was adopted by the Consultative Committee on International Telephone and Telegraph (CCITT), Telenet Communications Corp. began to make X.25 documentation available at the end of 1977. About 10 companies are currently testing the software on the Telenet network and more are expected, according to Peggy Karp, manager of network development for the packet network carrier.

When written for specific hardware systems, the interfaces are classified as higher level protocol software. Most of the modules are compatible with the X.25 features implemented on the Telenet network.

It is at this higher protocol level that software can be written to support asynchronous terminals for direct connection to the Telenet network. According to Karp, the first quarter of 1979 will see the introduction of a new group of synchronous interfaces based on the network testing now under way.

Available Products

Although some of the firms testing their interfaces are not yet ready to announce the products, a review of available software can give users an idea of what may be coming.

Computer Corp. of America has an X.25 interface that runs on the Digital Equipment Corp. PDP-11 operating under the RSX-11 operating system. The interface can be implemented for terminal-to-host, terminal-to-terminal or host-to-host applications, a spokesman said. The software costs $1,500 for installation plus a $350/mo license fee. Additional implementations within the same company are priced lower.

Advanced Communications Consultants of Santa Barbara, Calif., has an X.25 interface for the Burroughs Corp. B7700 mainframe. Designed for file transfer applications, it is currently in use by several cus-

(Continued on Page 33)

Univac Adds Terminal System Compatible With IBM 3270

BLUE BELL, Pa. – Univac has unveiled a terminal system compatible with the IBM 3270 (3271/3277) CRT system and based on the Binary Synchonrous Communications (BSC) line discipline.When used with a Pronto teleprocessing monitor on a V77 series minicomputer, the Univac 70-6470 allows clustering of many terminals on a single transmission line.

Included in the terminal system are the Model 70-6471 cluster control unit, the Model 70-6472 CRT keyboard terminals and the 70-6473 printer.

Supports 32 Terminals

The control unit reportedly can support up to 32 terminal devices and handle all of the protocol and buffering to interface those terminal devices to the processor through a communications line at up to 9,600 bit/sec.

The 70-6471 control unit may also be multidropped, allowing connection of more than one control unit on a single communications line, Univac said.

The control unit performs transmission error checking to validate communications between terminals and the CPU.

The 32 terminal devices which may be supported with one control unit are the 70-6472 CRT/keyboard terminals or the 70-6473 printers. Keyboards are available for data entry and typewriter key layouts, each detached from the CRT.

The 70-6472's CRT handles up to 1,920 characters in 24 lines of 80 characters each. Screen formatting includes protected/unprotected fields, numeric-only fields, display/nondisplay and dual intensity.

Insert and delete modes and full cursor positioning are remotely controllable.

The impact printer is connected to the 70-6471 control unit and will handle pin-fed forms at a rated speed of 40 char./sec. Because of a "look-ahead" feature, the printer's effective speed can be more than 60 char./sec, Univac said.

The 70-6473 printer has a 1,920-char. buffer and produces 10 char./in., six line/in., 132 char. line. It is said to operate quietly

(Continued on Page 33)

Firm Develops Private Net Using CNCP Service, Eclipse

TORONTO – Massey-Ferguson Ltd. (M-F) has used the digital transmission capability of Canadian National Canadian Pacific (CNCP) to configure a private digital network.

The net's developers used the Infodat service of CNCP along with the design resources of the carrier to configure a system which utilizes the Data General Corp. Eclipse S200 processor.

The system is used for communications among M-F offices and plants in the UK, U.S., Canada, South America, Africa and South Pacific countries.

Although the firm's world headquarters is in Toronto, corporate communications headquarters is in London, England. Robin McEwen-King, telecommunications director for M-F, described why the company decided to consolidate its communications services into two centralized message-switching networks – one in Toronto and one in London. "The primary objective was to save money," he said. "Our communications cost forecast indicated expenditures would rise to $30 million per year by 1980, and we believed that current technology in message-switching could reduce this anticipated expenditure by a considerable amount."

Most of the network traffic is low-speed on Teletype Corp. terminals at 75 bit/sec. But four Beehive International, Inc. CRTs operate at 1,200 bit/sec for message generation.

The network will be expanded to handle an APL financial application that runs on the

(Continued on Page 34)

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- **32** Programmer/Methods Analyst
- **41** Application Engineer
- **42** Other Engineering
- **51** Mfg Sales Representative
- **52** Other Sales/Marketing
- **60** Consultant
- **70** Lawyer/Accountant
- **80** Librarian/Educator/Student
- **90** Other ______

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X.25-Compatible Software In Works From 130 Sources

(Continued from Page 31)

tomers on the Telenet network.

Memorex Corp. is testing a software interface that will incorporate X.25 compatibility in its Model 1380 front end. It is expected that terminals connected to a 1380 will then be able to transmit data on the Datapac and Telenet networks. Comten, another front-end vendor in St. Paul, Minn., is reportedly working on a similar software interface for its processors.

Systar Corp., of San Jose, Calif., has an interface that will allow an IBM Series/1 to act as a terminal controller on an X.25 network. The IBM processors will support the models 4978 and 4979 CRTs and Teletype-compatible devices initially, and later versions of the interface will support IBM 3270 emulation and the 2780 and 3780 protocols through the network, a spokesman said. The first version is scheduled for introduction next November.

PDP-11 Interface

Cableshare Ltd. of London, Ontario, demonstrated an interface for the DEC PDP-11 at the Data 78 conference in Toronto earlier this year. The interface is now available for implementation on the Canadian Datapac network, and a Telenet version reportedly will be ready soon.

Cambridge Telecommunications Corp. (CTX) of Bedford, Mass., was one of the first software houses with an X.25 interface. It has a package called Dmep which modifies the IBM emulation package in 370X front ends. The interface costs $1,000 for installation plus $650/mo and options are available for additional channel adapters and 2741 support. This software is reported to be running on about 10 host systems on the Telenet network.

CTX also has an X.25 implementation for 3270 terminals which uses the Raytheon Raypak controller. With this software, the 3270 looks to the network like a processor-to-processor-type device.

The CTX software with the Raytheon controller is believed to be the only implementation thus far of a synchronous interface.

Initial software is limited to asynchronous support using the X.28, X.29 and X.3 standards that operate with X.25, Karp explained. Terminal handlers for synchronous higher level protocols such as 2780, 3780, 3270 and Hasp are expected early in 1979, she said.

Documentation available from Telenet includes details on all four CCITT standards.

Univac System For IBM 3270

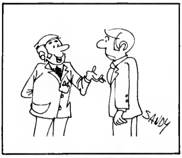
(Continued from Page 31)

and uses a cartridge ribbon.

Delivery of the terminal system is 90 days after receipt of order.

The terminal is supported with the Pronto teleprocessing monitor. Pronto also has screen mapping capability as well as printer support, Univac said.

The control unit costs $6,300; the CRT/keyboard, $4,300; and the printer, $9,900. All terminals are available for purchase only.



'Weil, Fortran Might Be Described as Being the Rosetta Stone of Cybernetics.'

Bell-Compatible Data Set Added to Rixon Line

SILVER SPRING, Md. — Rixon, Inc. has added a data set to its Bell-compatible line.

The Model T208A/B is said to provide the user with flexibility by providing all 4,800 bit/sec service capabilities in a single data set.

The T208A/B will operate half duplex over the switched network or full duplex over four-wire unconditioned private line circuits, the firm said, adding that by changing switch-selectable options, the data set can be converted from direct distance dialing to private-line operation.

The device is end-to-end compatible with the Western Electric Co. 208A and 208B data sets as well as the Rixon T208A and T208B data sets, the firm noted, and offers user front-panel-selected diagnostic visual indicators and test switches to enable rapid isolation of system malfunctions.

The data set also features adaptive automatic equalization and retrain; carrier-programmable transmit level; and user-selectable request-to-send/clear-to-send delay turnaround times of 50-, 150- or 600 msec.

The data set costs $2,180, Rixon said from 2120 Industrial Pkwy., Silver Spring, Md. 20907.

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HP Graphics Terminal Debuts

CUPERTINO, Calif. — An intelligent terminal addressed to graphics applications is available from Hewlett-Packard Co.'s Data Terminals Division.

HP's Model 2647A intelligent graphics terminal can plot data with built-in bar, pie, semi-log, log-log and linear graphics techniques and can be user-programmed in Basic.

A hard-copy device and printer may be shared between multiple 2647As, the firm said, adding that high-level graphics commands are featured to expedite applications programming. In addition, as much as 220K bytes of mass storage can be provided the terminal via dual minicartridges.

The terminal's alphanumeric CRT features multiple plug-in character sets, inverse video, half bright, underline and optional blinking, HP noted, adding the 1,920-char. 5- by 10-in. screen is organized into 80 columns by 24 lines.

The detachable bit pairing keyboard features user-defined soft keys, 18 control and editing keys, graphics pad, cursor pad, autorepeat, n-key rollover and a 4-ft cable.

The Model 2647A, two blank 110K-byte minicartridges and one 110K-byte system tape cartridge, plus user's manual, reference manual and Basic manual cost $8,300 from the firm at 19400 Homestead Road, Cupertino, Calif. 95014.

Firm's Private Net Uses CNCP Service, Eclipse

(Continued from Page 31)

M-F IBM 370/158 in Toronto, a company spokesman said.

The network includes an AT&T Infodat interface in Detroit, Mich. to connect carrier facilities. This interface is built around a Digital Equipment Corp. PDP-8 installed in Detroit and maintained by CNCP, the M-F spokesman said.

In 1975, CNCP was awarded a contract to design a message-switching communications network to meet M-F requirements. Among the system requirements were the capability to handle all teletypewriter services, high system uptime and 100% hardware and software support by CNCP. Installing the system at CNCP's Toronto facilities offered several environmental advantages, including standby power, controller operating conditions and 24-hour hardware suport.

The M-F message-switching system includes Telex fall-back and overflow — two Telex backup features, transmission speed of 9,600 bit/sec on control circuits, a system design which operates in conjunction with an existing dedicated wire service and a "mailbox" service which enables senior management personnel to communicate via computer terminals.

Security takes a high priority in the system and priority codes are used to establish where certain messages can be received. No message can be sent or received by a terminal unless the appropriate security code is present in the operator-entered address.

The decision to use a DG minicomputer in the M-F application followed a feasibility study of major minicomputer systems. A consortium of CNCP personnel was given the task of designing a message-switching system to operate on a minicomputer and to recommend a suitable hardware manufacturer.

The Eclipse S200 was selected because it met the established criteria. It provides a hardware stack and 16-level interrupt system that replaces software routines with high-speed hardware. The effective core memory cycle time of 640 nsec and an expanded instruction set provide increased throughput and enable more effective memory use. The system's data movement instructions were found to permit highly effective use of the CPU in data communication.

M-F has achieved a number of significant communications benefits since the system was implemented in 1977. The system provides the firm with a variable message format, controlled by the computer, as well as on-line control of codes and speeds from the Toronto communications center.

A mnemonic code ensures automatic message routing to the right station while message priorities can be designated.

In addition, the system provides a number of statistical messages on circuit and line status as well as variable control of message routing from the M-F communications center.

After about 15 months' experience with the CNCP system, McEwen-King described its performance as "extremely good. In fact, there are many features of the Toronto system we would like to have in our UK system. During the first few weeks of operation, the system had a fantastic record of uptime.

"On the economic side, our projections of about $2.5 million in cash savings over the first five years have been exceeded, to the point where we are curently saving at an annual rate of $2.5 million. This savings has resulted from a transfer of messages from the public network to our private network. Current costs are estimated to be about 35 cents per message," he said.

"The reliability of the system has instilled confidence in users, who in turn have doubled traffic volumes since the system was first put into operation," he added.

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Notes and observations from IBM
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The CADAM® System: Interactive Graphics for Design Engineers

Producing a modern aircraft can require more mechanical drawings than rivets.

Traditionally, engineers sketch, then draftsmen draft. Then engineers discover needed changes or improvements, and draftsmen draft some more. A lot more. Move a stiffener or bracket, say, two inches to the left, and a chain reaction of changes riffles through the entire set of drawings.

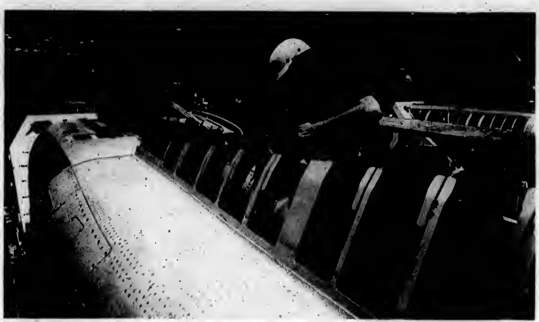
But now the computer has opened up a new way to meet design engineering needs with speed and reliability for a broad range of products, from high-performance aircraft to complex integrated circuits. The CADAM (Computer-Graphics Augmented Design and Manufacturing) system, a set of interactive programs available from IBM, allows the designer to sketch directly on the screen of a graphic terminal. He defines lines and contours by pressing keys and positioning a light pen, and the computer displays what he has expressed.

Curve fitting, or reducing the design to a set of control equations, is completed iteratively at the terminal, eliminating coding, card punching, and repeated computer batch runs. Then the CADAM system converts the preliminary design to a dimensioned drawing with auxiliary views.

If something needs fixing – if, for example, the dimensioned drawing reveals a problem of component or subassembly compatibility – the pieces can be moved around with the light pen and the CADAM system will revise all of the affected drawings. Automatically.

The CADAM system encourages doodling, an important source of design inspiration. The user can translate or rotate any graphic element. Or change its scale. Or stack parts, separate them, or watch moving parts move.

The CADAM system stores the design as it is developed, displays any element on demand, then generates the final detailed drawings. It supports complete design of the part, including structural members and such elements as ribs, stiffeners, lightening holes and fasteners. Once a design is stored in the CADAM system, analysis programs can calculate its weight or determine its structural properties. Any frequently used design element or drawing symbol can be stored and reproduced automatically wherever it is needed.



Engineers at Northrop Corp. use computer graphics to speed the structural design of high-performance jet aircraft.

The CADAM system converts freehand sketches, made directly on the CRT screen with a light pen, into fully defined and dimensioned graphics.

As its name implies, the CADAM system includes a direct link to manufacturing. It can generate a "part program" (path of travel) for the cutter of an automatic machine tool.

The CADAM system has cut drafting manhours drastically for engineering departments – by as much as 90 percent or more on a few special tasks. It helps prevent and correct errors and improves the quality of the engineering product. One user's experience is described below.

Productivity Up

Northrop Corporation is one of the world's largest manufacturers of high performance jet aircraft. Today, Northrop engineers design complex aircraft parts with the CADAM system in a fraction of the time they once spent working at drafting boards.

Says Northrop's Aaron Feder: "In addition to the time savings, we can identify improvements in design quality. Because changes are so easy to make at a terminal, we can keep up with changes traditionally required during the design development of an aircraft part and still release the drawing on time." Feder is manager of technical computer graphics at Northrop's Aircraft Division in Hawthorne, California.

"Before installing the CADAM system," Feder points out, "we ran a number of carefully controlled tests. When we saw productivity gains ranging from four to one to as high as 17 to one, for changes to a drawing, we saw the potential and decided to adopt it.

"We compared the manhours required to prepare several types of drawings using the CADAM system with the time requirements using our established manual systems.

"This involved a broad sampling of different types of drawings, including layouts, structural and electrical drawings. We saw productivity gains of four to one or better on every one of 14 test problems. Even though productivity is lower in the hectic, day-to-day development design world, the CADAM system has still proven cost-effective.

"Once a tentative design is in the computer," Feder adds, "we can run engineering analyses: calculating weights and determining the capabilities of the design aircraft and the dynamic behavior of its structure.

"The data required for this kind of analysis is already in our System/370, as a byproduct of the graphic design effort. That means another major savings in manhours, the elimination of a significant source of error, and the assurance that all departments are working from the same data."

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Decwriter Gains Concentrator

CHATSWORTH, Calif. — Micom Systems, Inc.'s Micro 800 data concentrator now has an option directed at users of Digital Equipment Corp. systems.

The LS120 and serial interface LA180 incorporate a buffer for temporary storage of incoming data when the printer runs out of paper or when data transmission is faster than 1,200 bit/sec, a Micom source stated.

If the buffer becomes full, the terminal reportedly will issue an XOFF command to the sending device, stopping transmission. The XON command follows when it is safe to resume, the source explained.

This feature is supported by the Micro 600's Decwriter option, allowing the user to avoid problems inherent in more expensive, statistical multiplexers, which can overrun a printing terminal after the XOFF command has been issued.

The Micro 800 uses statistical multiplexing techniques, allowing up to 16 asynchronous terminals to share a single telephone line at greatly improved efficiency, the firm claimed.

The Decwriter option is available at no charge on the 4-channel and 8-channel Micro 800 models as well as on the newer 12-channel and 16-channel models.

The 4-channel Micro 800 costs upwards of $2,000, the firm said from 9551 Irondale Ave, Chatsworth, Calif. 91311.

Omron Offers Replacement For Uniscope 100 and 200

SUNNYALE, Calif. — A low-cost CRT terminal from the Information Products Division of Omron Electronics, Inc. is said to provide a direct replacement or add-on alternative for Univac Uniscope 100 and 200 terminals.

The Model 8038/UET offers keyboard functions, a variety of display attributes, printer interfacing plus teminal diagnostics and other features not available in its Uniscope counterparts, Omrom claimed.

The Model 8038 emulates Uniscope line protocol, both synchronous and asynchronous, with all comparable transmission rates up to 9,600 bit/sec. It meets Uniscope 100 and 200 hardware and software requirements and provides all special Uniscope CRT characters, according to an Omrom spokesman.

Essential Uniscope commuications addresses are programmed via internal switches, but may be overidden through the UET keyboard to allow for temporary terminal relocation or other system changes, he added.

Unlike other Uniscope replacement teminals, the Model 8038 eliminates the need for external controllers, the spokesman said. The terminal plugs into existing multiplexers or connects to Univac host processors via a modem eliminator.

Remote terminals connect though a modem or multiplexer in place of Uniscopes, the firm said.

More Function Keys

The Model 8038 reportedly increases user flexibility by providing eight levels of video field attributes for all characters: normal and reverse video; normal and reverse blink; dim and reverse dim; underline and video off. A 15-in. diagonal CRT presents 1,920 characters in 24 lines of 80 characters each, with an effective 14 by 9 dot array for improved character definition and readability, the firm said.

Internal diagnostic provisions, activated automatically upon power-up, reviews memory and keyboard integrity and advise the user if any error is present. Line monitor mode allows the terminal to display the communications protocol.

Auto answer mode also is provided to shift the terminal into remote mode whenever host communications appears on-line, then automatically revert the terminal to local mode when host messages end, the firm said.

The Model 8038/UET costs $3,200 from Omron, 432 Toyama Drive, Sunnyvale, Calif. 94086.

Polarizer Panel Cuts Glare on CRT Screens

SANTA ROSA, Calif — A circular polarizer panel for CRTs from Optical Coating Laboratory, Inc. is said to reduce the glare problem on existing CRTs and make CRTs easier to read, even in a brightly lit environment.

The company's Glare/Guard Panel comes in common CRT sizes and is easy to install, a spokesman said. The panel can be easily retrofitted to newspaper composing CRTs, reservations and industrial displays, he added.

A kit with a 12-in. diagonal panel costs $75 while a 15-in. kit sells for $80, the spokesman said from Box 1599, 2789 Giffen Ave., Santa Rosa, Calif. 95402.

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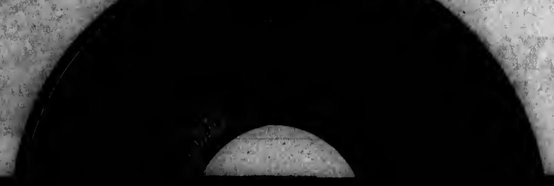

Univac NTR Emulator Runs With MDS System 2400

PARSIPPANY, N.J.—Mohawk Data Sciences Corp. (MDS) has announced a Univac Nine Thousand Remote (NTR) communications emulator for its System 2400 remote job entry communications equipment.

The NTR protocol supports both half-duplex and full-duplex line facilities with speeds up to 56k bit/-sec. The line discipline is supported on the Univac 1100 series host CPU operating under Exec 8, level 31.244 and above.

The NTR emulator will reportedly support most features and peripherals, including card readers, card punches and printers. Magnetic tape drives may be assigned as substitutes for card readers, punches and printers.

Software required to install the emulator is free and necessary hardware changes cost "no more than" $20/mo, a spokesman said.

MDS is at 1599 Littleton Road, Parsippany, N.J. 07054.

Datachecker POS Unit Gets Report Generator

SANTA CLARA, Calif. — National Semiconductor Corp. has announced a comprehensive report generator for its Datachecker supermarket point-of-sale (POS) system. Designed Management Information Program (MIP), the software provides standard reports in four categories: accounting, productivity, security and merchandising.

The MIP language creates either complete reports or exception reports — showing only significant deviations from predetermined goals.

In-Store Loading

The design of MIP allows any report to be easily and quickly modified through communications or in-store loading to maintain security and consistency, National Semi said.

MIP is an in-store facility that runs on the standard Datachecker POS processor. It does not require the use of expensive mainframe computer time. MIP can be added to any Datachecker Alpha S-18G system or newer model.

MIP costs $2,000, from National Semiconductor Datachecker at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Memory Aid Fits PDP-8s

ATLANTA — A core window module intended to enhance the capabilities of Digital Equipment Corp. PDP-8 processors used in network communications has been announced by Digital Communications Associates, Inc. (DCA).

The core window is a virtual memory management module that permits PDP-8s in a DCA network environment to access multiple host CPUs, contend for host computer ports, detect terminal transmission rates, link with other PDP-8s and monitor network performance, a DCA source said.

The core window effectively makes the PDP-8 in DCA network processors as fast as a PDP-11/40 minicomputer, the source claimed, adding the core window can be plugged into any PDP-8 omnibus.

The core window costs $1,000, the firm said from 135 Technology Park, Atlanta, Ga. 30092.

GOOD NEWS TRAVELS FAST.

TI is making immediate deliveries on 765 Portable Bubble Memory Terminals.

TI's *Silent 700** Model 765 Portable Data Terminal is an excellent companion on business trips, because it weighs only 17 pounds and fits under your airline seat. It also has an exceptional memory for sales orders, real estate listings, insurance information, newspaper stories or other data entry functions. Nonvolatile bubble memory retains data even with the power source off. The 765 can spend all day with you gathering and editing information, then transmit to your host computer at night when phone rates are lower.

The 765 is virtually silent when you're entering data on its typewriter-like ASCII keyboard, and printing data using its 30 characters-per-second thermal printhead. Its microprocessor-based control assures reliability and high-performance capabilities.

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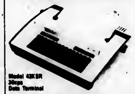

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With Rewiring, Modules

Telefile Doubles Univac 1108 Memory

IRVINE, Calif.— Telefile Computer Products has announced an enhancement to the Univac 1108 that will enable users to double that system's memory size to 524K words. The enhancement involves some rewiring of the machine and the addition of Telefile's Model T-7005 memory modules.

The expanded system, designated the Telefile 1108 X-10; is being offered on either a rework or replacement basis.

The only software change necessary to take advantage of the memory expansion is a new system generation (Sysgen); no changes to existing applications are required, according to a Telefile spokesman.

The modifications increase the number of memory module channels from four to eight without any loss either of speed or interleaving capacity and require significantly less space, power and air conditioning, the spokesman said; adding the Telefile memory modules are nonvolatile.

In discussing the enhancement, Telefile officials stresed that 1108 users can upgrade their systems to the same memory capacity as the Univac 1106, which was introduced after the 1108, while retaining a speed advantage over the slower 1106.

Two Choices

To upgrade a system, a user has two choices. The system can be shipped to Telefile's refurbishment center for modification, or the Telefile can give the user a reworked system in exchange for his system. A four- to six-week turnaround time is required for modifications to a user's system; a mainframe trade can be accomplished in 60 to 90 days, the spokesman said.

A typical rework, including 262K words of Telefile T-7005 memory, will cost approximately $440,000, the spokesman added. Although the first 262K words in the system can be any mix of Telefile and Univac memory modules, the second 262K words must consist entirely of Telefile T-7005 modules, he said.

Telefile Computer Products, a subsidiary of Telefile Computer Corp., is located at 17131 Daimler St., Irvine, Calif. 92714.

DDP Design — Part 1

Flexibility and Interfacing Major Factors in System Plan

By Grayce Booth
Special to CW

Two factors that must be taken into consideration in the design of a distributed data processing (DDP) system are flexibility and accommodation — the ability of the software to continue functioning without revision when the hardware is upgraded and the ability of the system to handle additional hardware, whether manufactured by the original or a different vendor.

In addition, the system itself must be transparent to users.

In developing Honeywell Information Systems, Inc.'s distributed system, we set the following design objectives:

> *This is the first half of a two-part tutorial on distributed data processing. Next week, Part 2 will discuss network control and evolution in greater detail.*

- Support for a wide range of hardware configurations.
- Ability to interconnect all types of HIS Series 60 equipment as well as selected equipment supplied by other vendors.
- Transparency of the network environment to application developers and end users.

Evolutionary Framework

The system, which we call the Distributed Systems Environment (DSE), offers an evolutionary framework; it provides capabilities today for connecting our large-scale systems and minis with the more complex system configurations we see coming in future hardware and software products. Since DSE defines how HIS Series 60 products fit together in distributed systems, it is properly called a systems architecture.

In our view, an architecture is a set of rules that details three things: the modularity of a system or system subset, the interfaces by which different functions communicate and the protocols by which the same functions communicate between mainframes.

Further, an architecture can exist at several

(Continued on Page 42)

Scientists Watch Light 'Bubbles' Becoming Mobile in Thin Film

SAN JOSE, Calif. — Scientists at IBM's San Jose Research Laboratory have discovered that microscopic sources of light from a particular class of electroluminescent thin films can become mobile under certain conditions.

When a voltage oscillating at a high enough frequency is applied across one of these thin films, tiny light-emitting filaments — each about one micron (.00004 in.) in diameter — appear to pour out from isolated points in the material and to swarm randomly about in it.

The possibility of finding applications for this surprising effect is suggested by the fact that the "light bubbles" appear to be an electrical analogy to the cylindrical domains of magnetism — known as magnetic bubbles — currently used for data storage, the scientists indicated.

Magnetic bubbles, which are about the same size as the light-emitting filaments, are also formed in thin films and they also exhibit mobility within these films. A number of ways have been found to control the motion of magnetic bubbles, and this had led to their application in devices for storing computer data at very high densities.

Similarly, a way of controlling the movements of these light bubbles would have to be found in order to find applications for them, the scientists noted.

Discovery of the mobile filaments occurred during experiments aimed at understanding the light-emitting properties of manganese-doped zinc sulfide films. Nonmobile light properties of these films are being investigated by a number of laboratories interested in information display technology.

Images can be formed in devices based on this material either by stimulating areas of the film with a light beam or an electron beam or by applying an "addressing" voltage across the film to induce light emission from selected areas of the material.

Storage Effect

An important feature of these so called alternating current thin-film electroluminescence (Actel) devices is a "storage" effect that enables them to retain an image for an extended length of time without the need to periodically refresh the screen, as necessary with CRT displays.

In the IBM experiments, an ac voltage was applied to the film via sets of cross metallic lines about one millimeter wide, the horizontal lines being deposited on one surface of the material and the vertical lines on the op-

(Continued on Page 40)

Light 'Bubbles' Observed

(Continued from Page 39)

posite. When voltage was applied to a pair of intersecting electrodes, the intersected area of film emitted light.

Each such area encompassed, some tens of thousands of individual light-emitting filaments. It is these individual filaments that became mobile.

As the frequency of the applied voltage reached the neighborhood of 10,000 Hz (cycle/sec), the threshold of filament mobility was achieved.

Looking at the light-emitting filaments through a microscope, the scientists saw the tiny spots of light moving in small, discrete steps from one location in the material to another. On close examination, it appeared the illumination was being transferred from one site to another through a process in which the emission from a filament is extinguished at approximately at same time as emission from another begins.

Raising the frequency of the applied voltage still further — as high as about 50,000 Hz — caused the mobility of the light bubbles to increase as they wandered over relatively broad areas of the film. When one bubble approached another, they repulsed each other.

Isolated regions in which the mobile bubbles were generated could be clearly seen in microscopic views of the material; at high frequencies; hundreds of the moving points of light appeared to pour out of these sources like water from a bubbling spring, the scientists said.

The locations of the sources of mobile filaments are thought by the researchers to be associated with microscopic defects in the polycrystalline structure of the zinc sulfide films.

The discovery of the mobile filaments was reported in a paper co-authored by Dr. Wolfgang Ruehle, Dr. Vincent Marrello and Dr. Aare Onton at the Electronic Materials Conference held in Santa Barbara, Calif., in late June. The conference was sponsored by the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers.

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Epson Upgrades Printer

TORRANCE, Calif. — Epson America, Inc. has introduced an upgraded version of its Model 10 line printer that features microprocessor control and a serial interface.

The 150 line/min printer, previously available only with a parallel interface, can meet all common interface specifications, a spokesman said, including RS-232C and the 20ma standard.

Other features of the printer include either a 48-character Ebcdic set or Ascii set with 64 or 96 characters, pin feed or friction feed for continuous forms and a one-line buffer. Printing on the unit is spaced at 6 line/in.

The printer offers an 80-character line. It can print on forms varying from 8.5- to 10 in. wide and up to 22 in. long. Vertical forms control is a punched paper tape unit.

An additional feature of the printer is a switch-activated self-printing function that can be used to perform a preprogrammed print exercise, without being connected to the host CPU system.

The printer sells for $2,260. Older models can be field-retrofitted to include the serial interface for a cost of $370, the spokesman said from 23844 Hawthorne Blvd., Torrance, Calif. 90505.

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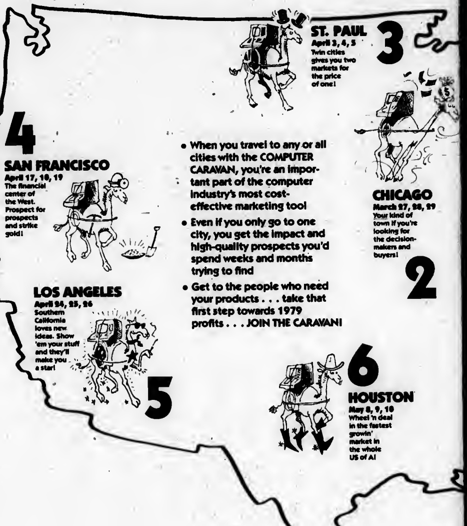
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Formatter and 75 In./Sec Drive

Digi-Data Introduces Products for Tape Users

JESSUP, Md. — Two tape products, a drive and a formatter, have been introduced by Digi-Data Corp.

The 75 in./sec Model 1840 tape drive provides a 120 kHz data transfer rate in NRZI, PE and dual NRZI/PE configurations. Available in 7- or 9-track, 200-, 556-, 800- or 1,600-bit/in. versions, the drive features a dual-gap, chrome-plated read-after-write head.

Tape protection in the event of power failure is standard with the drive, according to a spokesman.

The drive does not use a vacuum motor, thereby eliminating the pulleys and belts associated with it, the spokesman added.

In quantities of 100, the drive costs $2,570 for the NRZI version, $2,780 for the PE version and $2,920 for the dual version.

Embedded Formatter

Also introduced by the company was an embedded formatter which Digi-Data claimed is the industry's first truly microprocessor-based tape formatter.

The device is a programmable microprocessor with a 500-step NRZI or 1,000-step NRZI/PE instruction set to perform functions previously requiring dozens of integrated circuit chips, according to the spokesman.

The microprocessor is said to control timing and data paths, generate and check file marks, check characters and confirm the validity of data transfers.

All logic for the unit is on a single printed circuit board designed for compatibility with the company's Series 40 tape drives. Read-only memories are used for both program storage and special decoding functions, the company said, with power requirements for the formatter met by the host transfer.

The formatter controls up to four tape drives with any mix of standard speeds (12.5- to 75 in./sec), single or dual gap heads and 7- or 9-track configurations.

Standard functions on the unit include Edit, Variable or Fixed Length Erase and Forward or Reverse File or Record Spacing.

Data format and motion control are said to conform to IBM and Ansi standards

Prices for the formatter are $560 for the NRZI version and $1,120 for the NRZI/PE version in quantities of 100. Digi-Data is at 8580 Dorsey Run Road, Jessup, Md. 20794.

Topaz Units Protect Lines

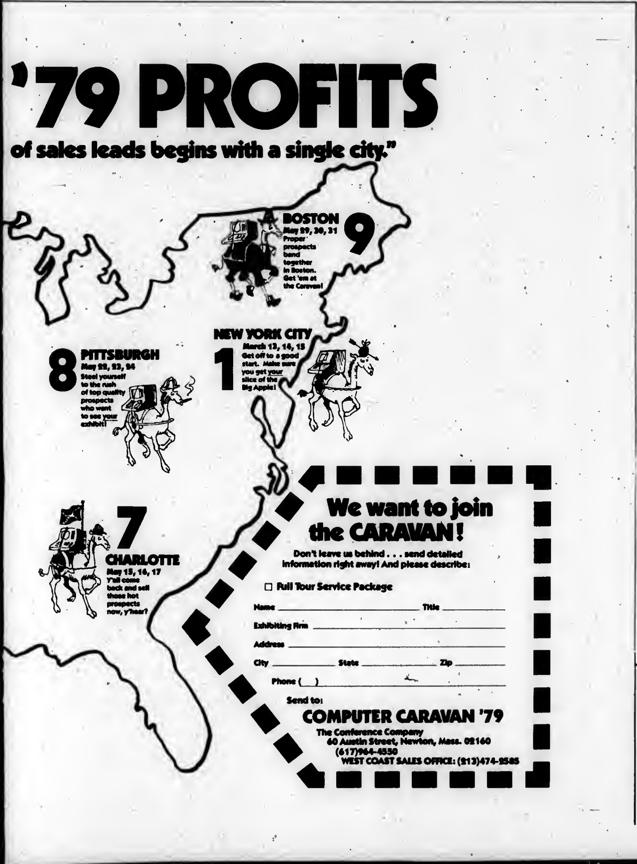
SAN DIEGO — Topaz Electronics, Inc. has unveiled a series of noise-suppressing Ultra-Isolators to protect computer systems from the effects of ac line noise, transients, spikes and lightning spikes.

The T-3 series is a redesign of an older series of isolators, a spokesman said, and is available for three-phase, 50 and 60 Hz current in ratings of 22.5, 30 and 45 kVa.

Three models are available at each power rating: a version with 126db noise attenuation and a coupling capacitance of .005pf, a 140db model with coupling capacitance of .001pf; and a 146db model with attenuation of .0005pf.

The devices have an efficiency of 98% (worst case) and can attenuate line noise up to 20 million to 1, the spokesman claimed.

The 22.5 kVA Ultra-Isolator costs $3,920, the 30 kVA model $4,610 and the 45 kVA model $6,175, the spokesman said from 3855 Ruffin Road, San Diego, Calif. 92123.



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Flexibility, Interfacing Prove Factors in DDP

(Continued from Page 39)

levels. A system-level architecture defines the relationships among the components of a large, complex distributed system, while a lower level architecture applies to the hardware and/or software of a particular product. In addition, architectures at all levels must be clearly compatible.

DSE is a top-level systems architecture, defining the overall relationships among the components of a distributed system and supporting our distributed system strategy. It also encompasses three lower level architectures, one for each of the three broad functions required in a distributed system. These are information processing, data base management and network processing.

Application Functions

Information Processing includes application-related functions, such as computation and data manipulation. All the functions normally executed by a general-purpose CPU except data base management fall within this category.

Data base management handles all user-owned storage of semipermanent data and is made up of access to the stored data and control of data structures.

Network processing provides control of the data communications facilities. Terminal handling, communications link control, concentration and routing are all included in network processing.

Lower Level Architectures

In addition to these three subordinate functions and the top-level systems architecture, DSE includes still lower level hardware and software architectures for each of the products that can operate within a distributed system.

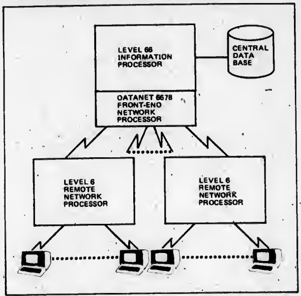
Functional modularity has been achieved in DSE by structuring the environment around the three basic functions mentioned above and by treating each of these as a major "module," making it possible to centralize or distribute each function selectively, regardless of the treatment of the other functions.

An example of this functional modularity is shown in the accompanying figure, which illustrates a system in which the information processing and data base management functions are centralized. The network processing however, is distributed; it resides partly in the central site's front-end network processor and partly in the remote minicomputer-based network processors used for terminal handling and concentration.

This figure exemplifies the distribution of network processing for link-cost economies and efficiencies.

Although the type of system illustrated here is not generally considered to be a distributed system, we feel it represents a valid subset of our DSE and is a relatively common configuration among users of large-scale computers today.

Booth is manager of Level 66 software product marketing for HIS.



Shown above is a system in which the information processing and data base management functions are centralized, but the network processing is distributed.

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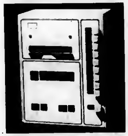

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From Pioneer Magnetics

Clock Writer Built for 3350 Types

SANTA MONICA, Calif.— A clock and sector writer designed to write the fixed-head timing track on IBM 3350-type "Winchester" disk drives has been introduced by Pioneer Magnetics, Inc.

The portable PM2390 provides state-of-the-art performance for production lines, field servicing or engineering design labs, Pioneer claimed.

The "super-smoothing" technique employed in the instrument's design is said to allow a closed clock track to be written at rates as high as 24M bit/sec with negligible jitter or phase shift.

Customer Patterns

Custom sector and address patterns, as well as open clocks with any gap length up to 100 microsec, can be written by the device, according to a spokesman.

The PM2390 can also detect area or pinhole defects and measure tracks following servo performance, he added.

The unit features origin or index writing, simultaneous track writing, variable bit symmetry control and selection of sector and address patterns via a front-panel switch.

A copy and delay feature can be used to copy data from one track to another, inserting a variable calibrated delay that permits a phase-shifting clock or sector tracks to match other tracks, the spokesman said.

Prices for the basic unit begin at $9,950, Pioneer said from 1745 Berkeley St., Santa Monica, Calif. 90904.

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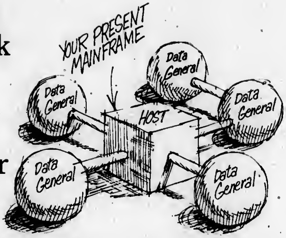

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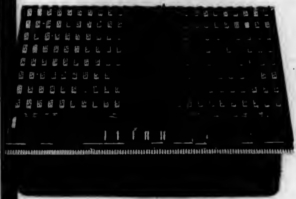

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Dataswitch Debuts Offer Energy, Peripherals Control

E. NORWALK, Conn.— A series of peripheral devices designed to optimize system energy consumption and to consolidate control of DP resources has been announced by Dataswitch Corp.

The Computer Environment Energy Control System (Ceecs) is the first product of its kind to allow user monitoring of peripheral control units — saving money, energy and extra shift usage, Dataswitch claimed.

Ceecs allows the IBM 360 and 370 user to exert power-on/power-off functional control from the central supervisory area of his computer room without affecting other systems and/or control units currently in operation, according to a spokesman.

The shift manager can observe the power status of individual control units displayed on Ceecs and — based on system application needs — power the control units on or off, saving energy and metered use, he explained.

Ceecs contains use meters that duplicate the metering of each control unit, the spokesman continued. The system can thus register each unit's time usage, allowing constant centralized energy monitoring. The meters also enable the shift manager to "load balance" monthly processing time on similar-type control units, potentially saving extra shift rental, the spokesman added.

Ceecs prevents "the most critical failure point in the multiprocessor computer environment" by incorporating redundant power supplies. Each supply features visual and audible alarms for indicating any malfunction.

In addition, the unit is said to employ an emergency power-off bypass circuit to allow connection or disconnection of a control unit without system interference.

Another Ceecs feature allows pushbutton power-down of all system control units without affecting the CPU's power on/off status, the spokesman noted.

Switching System

Dataswitch has also announced a peripherals switching system available in models it claimed are significantly larger, faster and simpler than the counterpart products of its competitors.

The CPS-1000 is offered in matrix sizes up to 8 by 24. That model features 192 switch points, the spokesman said. IBM's largest counterpart offers a 4 by 8 matrix and the largest T-Bar Corp.model has an 8 by 16 matrix, he noted.

The CPS-1000 features a switching speed of 2 nsec compared with IBM's 120 microsec and T-Bar's 75 msec, the spokesman said.

The switching system is comprised of 11 emitter-controlled logic (ECL) printed circuit boards. IBM's solid-state/discrete logic models include upward of 400 boards, and T-Bar's electromechanical offering has about 1,900 parts, the spokesman estimated.

The CPS-1000 is transparent to the host system, since it has no device address. Its switching and operating functions are totally independent of the CPU and cannot be upset by CPU malfunctions, the spokesman pointed out.

The system features self-diagnostics that can check cable-by-cable signal continuity; a "system-configuration-at-a-glance" display; "on-the-fly" channel switching for both high- and low-speed peripheral control units; and an optional printer to record matrix changes.

Terminal Switch

Dataswitch also unveiled the CTS-3000 coaxial terminal switch, claimed to be the first switching system designed to reconfigure any coaxial terminal to four or more controllers.

The CTS-3000 allows a supervisor to allocate terminals to specific controllers either individually or in a group. It indicates those terminals connected to each controller through an LED display.

Switch assemblies may be located up to 1,000 ft from the control console, permitting centralized terminal/controller functional control, the spokesman added.

Models 1, 2 and 3 of the CTS-3000 switch 16 terminals to any of four, six or eight controllers, respectively.

The system's assembly consists of eight independent two-circuit modules powered by redundant supplies for uninterrupted system operation.

The system features a maximum switching time of 500 microsec; it switches all terminals to one controller when the appropriate master controller selector button is pushed.

Ceecs costs $12,500; CPS-1000 ranges in price from $22,050 to $269,000, depending on the matrix size; and the CTS-3000 costs $5,000, $7,000 and $9,000 for the models 1, 2 and 3, respectively.

Dataswitch is located at Landmark Sq., Norwalk, Conn. 06851.

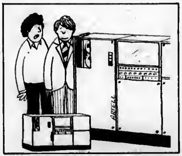
Pack for CDC 9766 Stores 300M Bytes

ST. PAUL, Minn. — The Data Recording Products Division of 3M Co. has introduced a disk pack that stores up to 300M bytes of information for Control Data Corp. 9766 and compatible disk drives.

The Model 949/300 has 19 recording surfaces and a total of 15,352 tracks, with 133 alternate tracks per pack. Track density is 384 track/in., with a prerecorded servo surface defining track location.

The coating on the disk pack is said to be resistant to chipping, peeling and cracking and to resist 91% alcohol when used in a cleaning mode.

The pack sells for $1,200. The company can be reached at P.O. Box 33600, St. Paul, Minn. 55133.



'Just What We Needed . . . a Mainframe Clone.'

High-End Option Debuts

Microdata Adds System to Reality Family

By Jeffry Beeler
CW Staff

IRVINE, Calif. — The latest addition to Microdata Corp.'s Reality systems series reportedly provides the same processing power and performance features as the family's most powerful member but costs $4,000 less than that system for a basic configuration.

Like Microdata's top-of-the-line Royale, the latest Reality model — designated Vantage — is said to support up to 32 terminals and use RPG-II as well as the firm's Data Basic and Proc languages and its English data retrieval language.

Vantage, however, represents a less expandable version of the older Royale system, according to, a Microdata spokesman. Whereas Royale holds up to 128K bytes of core memory and supports up to 600M bytes of formatted disk storage, Vantage expands to only 64K bytes of core and accommodates a maximum of 40M bytes of mass storage.

Together, Vantage and Royale form the high end of the Reality systems series, which also includes two other models — Reality and Reality II.

Microdata officials liken Vantage in processing power to the Hewlett-Packard Co. 3000, although they noted the HP system permits larger configurations than its Microdata rival.

Firmware Implementations

Unlike many other small business systems, Vantage implements its diagnostics and most of its key system elements in firmware rather than in software subroutines, the spokesmen explained. Some of these microcoded system elements include Vantage's terminal and interrupt handling routines, its data base management and manipulation functions and about two-thirds of its operating software.

In fact, Vantage's firmware is identical to Royale's except that the former system's microcode does not support disk storage beyond 40M bytes or main memory beyond 64K bytes.

Microdata officials credit Vantage's heavy reliance on microprogramming with boosting the system's throughput as much as four- to fivefold, depending on the application.

They also credit the firmware implementations with allowing programmers to execute a Data Basic instruction with each entry of Assembly language coding. This feature, the Microdata spokesman explained, eases programming and contributes to Vantage's speeded throughput.

Software-compatible with the other members of the Reality line, the Vantage system can be upgraded to a Royale by modifying the smaller system's backplane and replacing the Vantage

(Continued on Page 52)

System Helps Car Repair Firm Minimize Inventory Surpluses

HARTFORD, Conn. — Inventory overstocking has posed little or no problems at Bughaus, Inc. since the network of Volkswagen service centers automated its management and accounting paperwork with a real-time minicomputer system.

At each of the company's eight remote repair locations, the value of auto parts inventories now averages $12,000 to $14,000, according to Bughaus president Fred Sawyer. Under the firm's previous batch processing system, those inventories averaged $16,000 to $19,000 per center.

Sawyer also credited the minicomputer system with eliminating discrepancies between reported and actual stock levels at Bughaus' remote parts warehouses.

In addition to strengthening the firm's inventory control — which the company president calls "our most important application" — the current system has cut Bughaus' check reconciliation turnaround from an average three hours to about seven minutes, Sawyer said.

Using its library of nearly 100 Cobol programs, the system independently controls inventories at each of the company's remote sites and at the same time maintains a master stock list for all the locations. From this data, the system then produces man-

(Continued on Page 52)

Bookkeeper Donna Merzwa enters sales transaction data into an accounting and inventory control system at Bughaus, Inc., a Volkswagen service center network based in Hartford, Conn.

Controller Suits LSI-11s, Provides PE, NRZ Formats

ANAHEIM, Calif. — Compatible with all members of the Digital Equipment Corp. LSI-11 series, a tape system controller from Western Peripherals provides both phase-encoded (PE) and NRZ formats, according to spokesmen for the company.

With the Model TC-150, users can reportedly mix up to eight 7- or 9-track NRZ, PE or dual-density tape units in any combination.

Software compatible with any system having DEC TM-11 support, the controller accommodates any industry-standard tape drive unit, including those that operate from 12.5- to 125 in./sec, the officials said. Standard equipment includes a Q-bus buffer that allows remote installation in an expansion chassis up to 10 ft away.

Other features include a 33-word data buffer instead of the usual 2-byte buffer to aid assignment of priorities to a computer. A "read-and-write-on-the-fly" capability, meanwhile, permits automatic, nonstop operation during consecutive read/-write operations.

With cables and other connectors, the controller costs $3,500 from Western Peripherals Division, Wespercorp, 1100 Claudina Place, Anaheim, Calif. 92805.

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Mini Cuts Costs by 20%

Hospital Makes 20% Excision in Energy Bill

By Marguerite Zientara
CW Staff

MIAMI — Mercy Hospital here has sliced 20% — $12,350 — off its $50,000-plus monthly energy bill with a minicomputer-based power management system.

"We'll easily save $120,000 in the first year," according to Shelby Mitchell, the hospital's assistant executive director, who estimated the system has cut Mercy's energy consumption by more than 350,000 kilowatt hours per month. During peak cooling periods, the institution's monthly power bill has shrunk as much as 24%.

Three years ago Mercy Hospital administrators set out to bring their skyrocketing energy bills under control. At first they tried the traditional methods — turning off lights, lowering thermostats and water heater temperatures for nonpatient facilities — but with no noticeable effect.

They next tried manual devices like timers that turned off certain types of equipment at different hours of the day — again with insignificant savings, according to Mitchell.

Air-Handling Units

Then, 10 months ago, the hospital installed a 48K-byte IBM Series/1 with a Facility Control/Power Management (FC/PM) program. "Our goal was to absorb at least two years of rate increases without increasing our cash flow for electrical costs," Mitchell said.

"The cost of energy has been going up 15% to 20% a year, coupled with a 10% increase in our own utilization," he added. "Start calculating the impact, and in a few years you come up with a 100% increase."

The mini reduces consumption and limits demand by controlling the air-handling units in the 630,000-sq-ft hospital and professional building. In the fall, a 65,000 sq-ft surgical pavilion will also come under the computer's control.

Every 15 minutes the system evaluates demand. When power consumption approaches the targeted limit, the computer begins turning off air-handling units in a prearranged sequence based on each unit's relative importance to hospital operations. Depending on whether the outside temperature is above or below 72°, the computer operates with one of two programs.

"Since some of the buildings in our complex are 25 years old and others are only five years old, they are constructed differently," Mitchell explained. The newer buildings require more electricity than the older ones because modern structures contain more glass in their exterior walls. During warm weather, they allow more heat inside and therefore require more air conditioning.

"So we monitor outside air conditions to determine the targets we need to set for demand control," Mitchell said.

System Reads Meters

Under the hospital's earlier energy control systems, staff members couldn't read power consumption meters and then perform the necessary calculations fast enough to effectively control Mercy's air-handling equipment, according to Bill Preston, general superintendent of plant operations. "The current system, by contrast, can read the meters, calculate the results and decide what to do in seconds."

In addition to the CPU, Mercy Hospital's system currently incorporates an IBM 4955 diskette drive, but when the surgical pavilion is completed in the fall, the system will undergo expansions.

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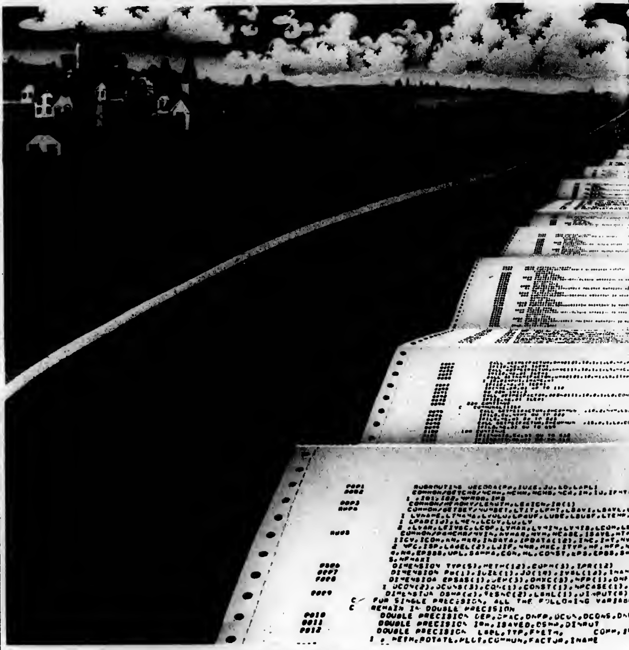

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All of which makes the new human-engineered VAX the perfect system for people in computer centers and academic departments who are running big programs, arrays, data reduction and analysis, and large statistical packages.

VAX also offers ANSI 74 COBOL and full BASIC PLUS 2 to make it ideal

Interdata Cuts Prices On 16-Bit Mini Package

OCEANPORT, N.J. — Interdata has cut prices 10% for its packaged 16-bit minicomputer system, the Pack 160.

The price cut, which takes effect immediately, means a Pack 160 with a 64K-byte Model 8/16E processor, 10M-byte disk unit and Model 1100 CRT terminal now costs $23,500, according to Interdata.

That same configuration also includes Fortran IV and OS/16MT2 software, auto-load program, universal clock, multimedia diagnostics package, power fail/auto restart and display panel.

Interdata is located at 2 Crescent Place, Oceanport, N.J. 07757.

Interfaces Link Minis, Analyzers

PALO ALTO, Calif. — Three interfaces from Hewlett-Packard Co. are said to facilitate connections between minicomputers and logic analyzers.

Two of the interfaces — the models 10275A and 10276A — hook to Digital Equipment Corp.'s minicomputers. The third accessory — a general-purpose probe interface consisting of the 10277 models A, B and C — accepts analyzer probe pods and then connects to the system under test, according to HP officials.

Packaged on one quad-height board, the Model 10275A plugs into DEC's PDP-11 small peripheral control slots to access all 56 bus signals. Circuits on the interface board are said to generate a clock signal from asynchronous bus activity for the logic analyzer.

The Model 10276A, a dual-height board, plugs into DEC's LSI-11 to access all Q-bus signals, HP said. Circuits on the interface demultiplex both address and data buses and generate a clock signal for analysis of asynchronous bus activity.

Selective qualification of Q-bus activity permits users to selectively capture or exclude reads, writes, interrupt vectors, refresh activity or direct memory access transfers, the officials said.

Probe Interfaces

The three general-purpose probe interfaces, meanwhile, interconnect logic analyzers and digital systems through probe pod "buckets" and two 40-pin connectors and ribbon cables.

The removable board reportedly has space for circuits that permit preprocessing of signals or latching of data. The Model 10277A operates with HP's Model 1610 logic analyzer, the Model 10277B works with the Model 1615A and the Model 10277C operates with the models 1600A and 1607A.

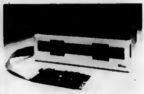
The 10275A, 10276A and 10277 systems cost $300, $375 and $400, respectively, from HP 1501 Page Mill Road, Palo Alto, Calif. 94304.

Floppy Stores Up to 512K Bytes

SANTA CLARA, Calif. — Up to 512K bytes of formatted storage are available with a floppy disk system that occupies 5.25 vertical in. of a standard 19 in.-wide rack, according to the product's manufacturer, Data Systems Design, Inc. (DSD).

Designed for the Digital Equipment Corp. LSI-11 and LSI-11/02, the DSD-110 offers a built-in, 32-word hardware bootstrap that reportedly frees a Q-bus slot for other users.

The DSD-110 costs $3,195 from DSD at 3130 Coronado Drive, Santa Clara, Calif. 95051.



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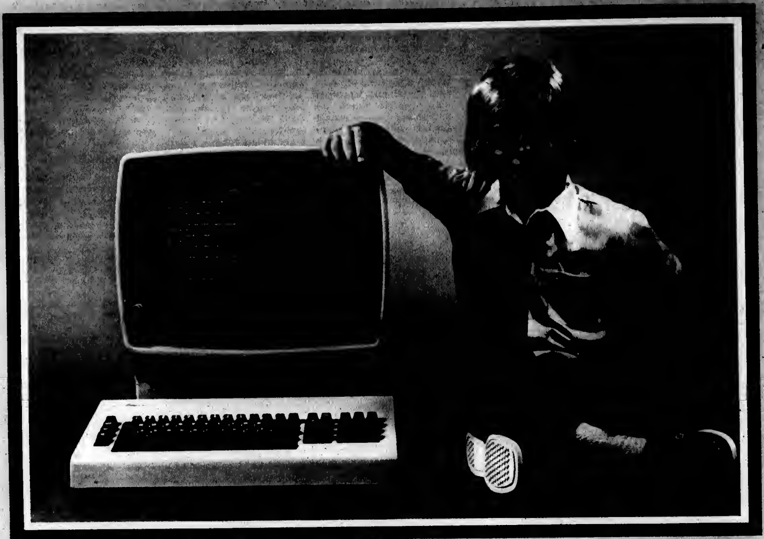

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Minis Help Banks Simplify Trust Management

By Marguerite Zientara
CW Staff

WAYNE, Pa. — More than 200 U.S. and Canadian banks have simplified the management of their complex trust accounts with a battery of minicomputers at SEI Corp., a Philadelphia area trust accounting services firm.

Some of SEI's customers include Wells Fargo Bank in San Francisco, Seattle First National Bank, Philadelphia National Bank and Guaranty Trust of Canada, a coast-to-coast institution based in Toronto.

Through more than 600 remote terminals, these and other customers can access the trust account information they have stored in SEI's minicomputers and automatically manage cash positions each day, according to SEI president Steven Katz.

For years, attempts to computerize trust management resulted in "largely unsatisfactory" in-house systems, Katz said. Yet, because of its complexity and the huge volume of back-office manual labor it generates, trust management remained an attractive target for automation, he added.

Whereas savings and checking accounts require many simple DP operations, trust accounts involve fewer but more complex transactions.

For example, payments to beneficiaries can be regular or irregular, and the trust can include cash, stocks, bonds, real estate or oil wells. In addition, federal, state and local banking regulations must be followed; broker's, attorney's and trustee's fees must be paid; and several balances must be periodically updated, Katz noted.

Trust Requirements

Furthermore, in many situations, banks must perform the complex trust account transactions almost at a moment's notice, Katz added. These requirements have complicated efforts to fit trust management into the mainstream of banking DP.

When SEI began offering its services on Jan. 1, 1972, it used two Model 1646 minis and two Model 1648A minis, both from Honeywell Information Systems, Inc. In 1974, the firm changed to a Prime Computer, Inc. Model 400 "because Honeywell wasn't really offering its products anymore," according to Katz.

Growth Strategy

SEI's strategy of growing in small increments demanded systems compatibility, Katz explained.

SEI also needed a computer that was "reliable, able to accommodate the customization required for each customer and powerful enough so that each computer system could handle as many as 20 banks while allowing each interactive access to the computer," Katz said.

In the four years since SEI installed its first Prime system, "we've averaged a new computer coming in the door every seven weeks," Katz said. Downtime with the systems has averaged less than 1%, he added.

Main Benefits

Katz cited "a better price-performance, many more users per system and virtual memory" as the current system's main benefits.

SEI's Trust-Aid computer system incorporates 29 1M-byte Prime 400 computers, each with three 300M-byte disk units, one 80M-byte disk system and two tape drive units.

In all, the service firm uses 58 tape units, eight Data Products Corp. Model 2470 1,200 line/min printers, one card reader and 50 terminals in its computer center, Katz said.

The terminals at the company's computer center include Digital Equipment Corp. Decwriters and Lear Siegler, Inc. ADM-3 CRTs, Katz said. The nearly 600 remote terminals include Lear Siegler ADM-3s, Decwriters and Perkin-Elmer Corp. Foxes.

When a bank becomes an SEI client, its trust operations must be converted from a manual setup or some other computer system to the SEI system. The process takes 10 to 20 weeks and includes the transfer of the existing data base to the Trust-Aid computer as well as the training of customer staff.

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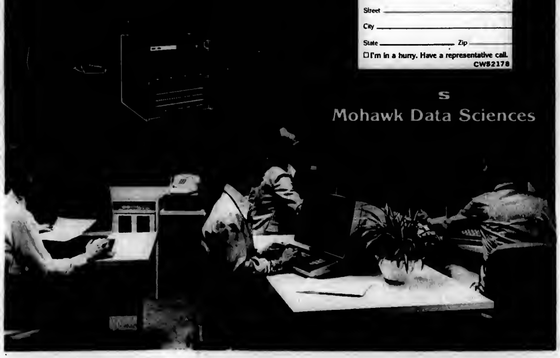

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Tape Subsystem Bows

NORWOOD, Mass.— Both 1,600 and 6,250 bit/in. operations are said to be possible with a 75 in./sec tape subsystem from Raytheon Data Systems Co.

Intended for the Raytheon RDS-500/5000 and Apollo minicomputer systems, the Model 51520-25 uses group-coded recording in 6,250 bit/in. operation and phase-encoded recording in 1,600 bit/in. operations.

At 6,250 bit/in., the system also transfers 470k byte/sec; at 1,600 bit/in., 120k byte/sec, the spokesman said.

Advantages of the subsystem's dual-density capability reportedly include four times greater throughput, improved error correction and four-to-one file compaction on multireel files.

With a controller and the Model 51525 tape unit, the 51520-25 subsystem costs $40,800. Up to three additional tape systems can be attached to the subsystem for $14,000 each.

Raytheon is at 1415 Boston-Providence Turnpike, Norwood, Mass. 02062.

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System Helps Car Repair Firm Cut Down Inventory Surpluses

(Continued from Page 47)

agement reports on the approximately 3,500 auto parts Bughaus buys from its 700 vendors.

The system also controls accounts payable, accounts receivable, general ledger and payroll and generates productivity reports for the remote site managers as well as profit-and-loss statements for executives at the company headquarters.

In addition, it processes and stores the repair orders, bank deposit slips, charge slips and balance sheets the central office receives each day from each remote Bughaus location, Sawyer said.

Before the firm acquired its current system, personnel here performed these applications with a keypunch-card configuration built around a Burroughs Corp. B1700 minicomputer. Unfortunately for Bughaus, the previous hardware created various problems that increased in severity as the company grew.

The system's disk space proved limited, and its throughput proved woefully inadequate, Bughaus' vice-president and DP manager Richard Berger recalled. To make matters worse, "Data entry and job turnaround times were slow because we had to wait a considerable length of time for computer cards to be keypunched, verified, sorted and merged with sequential files before processing," Berger explained.

Moreover, the company's keypunch operator also doubled as a card reader operator. Thus, "if one of our people was keypunching, the system couldn't be used for anything else that required input," the DP manager added. "With the batch-oriented system, we had to schedule everything we did very carefully.

To overcome these and other operational hitches, Sawyer and Berger decided to replace their batch processing system with a real-time alternative that would provide increased main memory disk capacity and printing quality. They also demanded that the replacement system be affordable by their $1.8 million/year firm and that the equipment be able to accommodate Cobol programs.

At first, Sawyer and Berger considered installing hardware from IBM, NCR Corp., Control Data Corp., Univac and several other vendors, but none of the systems they evaluated would have "fit into our operation without necessitating a major overhaul of our programs," the company president said.

Only after they had rejected bids from most of the major U.S. hardware manufacturers did Sawyer and Berger finally evaluate and later install a minicomputer system from Wang Laboratories, Inc. Built around a 128K-byte 2200VS CPU, the system incorporates two 10M-byte 2260V fixed/removable disk units, a 240 line/min 2261V matrix line printer and three 2236P CRT terminals.

Reality Line Gets Larger

(Continued from Page 47)

firmware set with its Royale counterpart.

Although Microdata provides these dual modifications as an extended performance feature, company officials regard a Vantage upgrade as uneconomical and advise against the procedures.

A basic Vantage hardware configuration consists of a 16K-byte CPU, 10M-byte Marathon disk system, 165 char./sec matrix printer and Prism CRT terminal. In a typical maximum configuration, the system incorporates a 64K-byte processor, four 10M-byte disk units, a 165 char./sec printer and CRT terminal. The system also provides optional 300- and 600 line/min printers.

The basic Vantage configuration costs $31,995, compared with $35,995 for a similarly configured Royale. The maximum Vantage configuration, meanwhile, costs "about" $70,000, the spokesman added.

Microdata is located at 17481 Red Hill Ave., Irvine, Calif. 92713.

Coating Lengthens Life Of Memorex Cartridges

SANTA CLARA, Calif. — A proprietary disk coating formulation reportedly improves the data integrity and extends the life of Memorex Corp.'s line of disk cartridges for minicomputers and small business systems.

The Mark V front-loading cartridge suits the Hewlett-Packard Co. 7905 and similar drive units and, depending on the application, records up to 6,060 bit/in. with up to 200 tracks/in.

The Mark V top-loading cartridge offers the same bit and track densities as the front-loading version and suits cartridge systems compatible with Amcomp, Inc., Data General Corp., Datapoint Corp. and Wangco, Inc. models, the spokesmen said.

Both cartridges reportedly use a "particle-oriented disk" coating formulation, which reduces head wear, and a package design that minimizes stress on head assembly during shipment and storage.

Prices for the Mark V product line start at $160 from Memorex, San Tomas at Central Expressway, Santa Clara, Calif. 95052.

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Home Micros Have Way to Go: User

By Marguerite Zientara
CW Staff

NEWTON, Mass. — "I think home computers are not really ready to be used on a widespread basis by the public because they are not really reliable yet."

That was one user's opinion eight months after he bought a microcomputer and programmed it to analyze his family's budget and cash flow.

Douglas Wales has enjoyed his computer and has used it to help his daughter with math and for programming games for his children. But, he said, "there are enough glitches in the software or one runs out of memory space or just random problems cause it to fail."

He cited the cassette drive on his Commodore Business Machines Pet system as an improvable item. "It is certainly a more convenient way of entering data than toggle switches, but it still takes a long time to enter a program or retrieve it later," he said.

"Once floppy disks are hooked up, I think things will change radically for the better," he noted.

Wales saw the Pet advertised at a trade show in Boston last year and eventually sent away for it. Originally he had planned to build his own, but soon realized he didn't have the time.

He started considering brands that were "already put together" and found that the only two in his price range were made by Radio Shack and Commodore. "I really didn't like the idea of stringing out the TV monitor screen, keyboard, power supply and tape recorder all interconnected on the table," he said. So he chose Commodore's compact unit over Radio Shack's system.

In addition to his $595, 4K memory computer, Wales has acquired a $650 GTE Selectric-based Novar printer which he intends to incorporate into a text-editing and word-processing system for use in his work as a psychologist.

"In psychological testing and psychological testing reports, there's a lot of clerical work to be done. Most all such tests require a fair amount of time for scoring," he said. "I think the computer would save time on that."

However, Wales has not yet been able to use it for these tasks, he said.

"I originally bought a computer because I realized this technology is going to be around for a while, so it would be worth my while to invest in it and get used to it," he said.

Wales estimated that in "another year or two" microcomputers will be reliable enough for the general public. Until then, he said, someone who owns a micro "has to be interested in computers and be willing to treat it as a hobby."

Fairchild Unveils 16-Bit System

MOUNTAIN VIEW, Calif. — Fairchild Camera and Instrument Corp. has introduced the Spark-16 single-board, 16-bit microcomputer based on the firm's 9440 Microflame CPU.

The 9440 operates at a clock rate of 10 MHz and executes the Data General Corp. Nova 1200 instruction set.

Spark-16 was developed primarily for exercise and evaluation of the 9440 Microflame but can also be used as a standalone micro for applications that require small amounts of memory.

The unit has the standard S-100 connector, 8K bytes of Random-access memory (RAM), 4K bytes of programmable read-only memory (Prom) and memory control with direct memory access.

It also features an asynchronous port for current-loop. or RS-232C interface, a 100-pin edge connector with the 9440 bus and control switches for Autoload, Continue, Halt and Reset.

The board comes fully assembled and tested with Firebug, the firm's interactive entry and debugging program, resident as firmware in the Prom.

Spark-16 costs $995 from Fairchild's Semiconductor Components Division, 464 Ellis St., Mountain View, Calif. 04042.

Micro Chips

Mits 8800b Adapted For Communications

BLACKSBURG, Va. — A telecommunications system for the Mits Altair 8800b microcomputer has been introduced by the Microware Division of Physical Biological Sciences, Ltd.

The system enables the Mits 8800b to be used as an intelligent terminal in two-way communications with a remote time-sharing device over phone lines using an acoustic coupler.

The system consists of an Assembly language routine and another program written in Mits disk-extended Basic. Control commands are provided so the operator can switch command console communications back and forth from the remote device to Mits, the firm said.

The system includes an 8800b with 32K memory and one or more floppy disks.

The $195 system price includes the source listing and a user's manual, which may be purchased separately for $20 from Microware PBS, P.O. Box 47, Blacksburg, Va. 24060.

EMM Adds NMOS Memory

HAWTHORNE, Calif. — Electronic Memories & Magnetics (EMM) is offering a 16K-word by 8-bit random-access NMOS memory system that is S-100 bus- and card-size-compatible.

The Model 1104 is a single card plug-in assembly that works with the Poly 88, Imsai, Mits, Compal-80, TDL and Cromemco systems, according to the firm. The 1104 uses 4K static random-access memory (RAM) and no refresh or "pump" circuitry is required, the firm said.

In addition, the 1104 consists of the memory array with support electronics, including address and data buffering, timing and control and voltage regulation. Operating modes are read, write and deposit.

The Model 1104 costs $395 from EMM, 12621 Chadron Ave., Hawthorne, Calif. 90250.

Pet Gains 20K-Byte Add-On

LITTLETON, Colo. — Digimates, Inc. has introduced add-on memory for Commodore's Pet microcomputer with up to 20K bytes of storage provided on one card, according to the company.

Adapter hardware allows the use of Pet's internal power supply or user-supplied external supply. The user has the option of installing the memory card either inside Pet or externally in user-supplied cabinetry, the firm said.

The 4K static memory technology is used so the card will work at the Pet 2000's full rated speed.

The memory costs $695 from Digimates, Inc., Box 593, Littleton, Colo. 80120.

Peripherals Option Unveiled

EUGENE, Ore. — Northwest Microcomputer Systems is offering a peripherals option card for its 8085A-CPU-based microcomputer systems which gives the user the flexibility of continual expansion, the company said.

The NMS 85/EX gives the user the option of an arithmetic processing unit, an interrupt controller, an interval timer, a parallel I/O interface and a serial I/O interface. Each can be purchased separately from the company.

The card costs $158 from the firm at 121 E. 11th St., Eugene, Ore. 97401.

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SCI Offering Replacement For 8010 Single-Board CPUs

WALTHAM, Mass. — System Computers and Interfaces (SCI) has developed a plug-compatible replacement for the Intel Corp. and National Semiconductor Corp. SBC 8010.

The SCI 8010 is a Multibus-compatible replacement that provides two independent serial I/O channels which operate in current loop, RS-232C or opto-isolation modes, the firm said.

The unit will drive all Intel or SCI boards that plug into the SBC 8010 backplane. It has 1K of static random-access memory (RAM) and sockets for 8K bytes of electrically alterable programmable read-only memory.

In addition, the SCI 8010 has 48 programmable I/O lines with direct bit set/reset capability and can provide a single level interrupt with six on-board and two off-board interrupt sources.

The dual serial ports facilitate adaptation to communications interfaces, such as the IBM 2770 Bisync communications protocol, the firm said.

The SCI 8010 costs $350 from Systems Computers and Interfaces, 223 Crescent St., Waltham, Mass. 02154.

'PLZ' Language Designed For Use With Zilog Line

CUPERTINO, Calif. — Zilog, Inc. has introduced a system programming language that provides program writing, compiling and code generation and is designed for its own family of microcomputers.

Called PLZ, the language is implemented as a set of disk-based programs that run in the operating system of Z80-based microcomputers. PLZ can also be linked to other languages such as Basic, Cobol and Fortran.

PLZ permits high-level machine-independent modules and low-level machine-dependent modules within the same program, the company said. The high-level modules use the procedure-oriented PLZ/SYS language, which provides a medium for expressing algorithms in high-level structured fashion.

PLZ/ASM, a structured Assembly language, reportedly provides all the low-level programming capabilities for the user to manage such processor resources as registers, memory, accesses and I/O operations.

It costs $1,250 from Zilog, Inc., 10460 Bubb Road, Cupertino, Calif. 95014.

Short Courses On Micro Topics Begin This Fall

SANTA MONICA, Calif. — Integrated Computer Systems, Inc., is offering intensive short courses on microprocessors and microcomputers throughout the fall and winter in a number of cities around the country.

A week-long course dealing with microprocessor project management and microcomputer programming and interfacing will be held in Los Angeles, Sept. 18-22; New York, Sept. 25-29; San Diego, Oct. 30-Nov. 3; Chicago, Nov. 6-10; Washington, D.C., Dec. 4-8; Atlanta, Dec. 11-15; Los Angeles, Jan. 15-19; Denver, Jan. 22-26; and Dallas, Jan. 29-Feb. 2.

Tuition ranges from $195 for a one-day session to $695 for the entire week.

For information on this or other courses including Distributed Processing and Computer networks, Computer Graphics, Modern Methods of Digital Signal Processing and Fibert Optic Communication Systems contact Integrated Computer Systems, Inc., 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Microage Adds Program Disks

TEMPE, Ariz. — Microage is offering a variety of new applications software on minidiskette, packaged in Northstar format, which can run in any S-100 8080/Z80 system.

The applications include financial, mathematical analysis and statistical programs as well as games. Other applications include a backorder program using disk data files, a mailing list program using disk data files and a disk operating system for Centronics printers on retail sales reporting.

Each costs $35 from Microage Mail Order, 803 N. Scottsdale Road, Tempe, Ariz. 85281.

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Computerworld's September 25th Special Report, *Stretching the DP Dollar*, will tell you how to do just that — with articles, tips, and pointers on dozens of ways to save DP expense within your organization. Edited by Ann Dooley, *Stretching the DP Dollar* gives you first-hand accounts of how various users have trimmed *their* DP operating costs. We'll have advice from vendors as well, and you'll learn about things like:

- *CPU's as a way to cut hardware costs*
- *Independent maintenance*
- *Auditing your DP system*
- *Buying and selling a used computer*
- *Upgrading outmoded equipment*
- *Tapes and disks: a cost comparison*
- *Security methods and disaster planning*
- *and more....*

If you're in any way concerned with where the DP money goes in your firm, don't miss our September 25th Special Report. And if you market products or services which save DP dollars, tell people about them in this Special Supplement. Closing date is September 8. Your *Computerworld* representative can give you complete assistance in ad planning. Or, to reserve space for your ad, call Terry Williams at (617) 965-5800.

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'Cycle Guarantees Obsolescence'

Report Slams Federal DP Procurement

By Brad Schultz
CW Staff

WASHINGTON, D.C. — "Major computer vendors" that sell to the federal government generally agree that 80% of the government's computer systems are at least six years old, with the other 20% more than three years old.

So said a recent investigative report to the U.S. House of Representatives Appropriations Committee, which blamed the obsolescence of most federal DP facilities on the slowness of the government's standard procurement procedures.

"A typical procurement cycle for a major system will last two years," the report explained; "[and] if a vendor should protest, the procurement can be stretched out to three years or more." And to this must be added the year between the vendor's equipment announcement and the first mention of this availability on the General Services Administration (GSA) schedule.

"By the time the brand new equipment is delivered to the government, it is at least three years old if there is no protest, or more than four years old if it is protested," the report stated, noting that "in the rapidly changing computer industry, three years represents a point of obsolescence, and the present cycle indicates guaranteed obsolescence."

The committee's investigative staff added that it had been "advised by the major computer vendors" that discounts from GSA list prices offered to government DP buyers reflect "an index of obsolescence" — that is, the DP merchandise purchased is generally obsolete in proportion to the discount.

However, "the discounted selling price is still higher than one would expect under normal conditions," the report continued. "The reason for this was also provided to the investigative staff by the vendors. These vendors stated that when a government procurement specifies a benchmark, the government ends up paying for it in the delivery price."

A government-specified benchmark is a means of verifying vendor claims of hardware/software performance, the report explained, and normally is the result of executing a group of "representative" computer programs on a vendor's proposed computer system in the presence of the prospective purchase agents.

Re-Evaluation Urged

The investigators called for an Office of Management and Budget re-evaluation of federal benchmarking requirements and the other GSA DP procurement procedures. "An in-depth study should be performed . . . to consider a practical, more functional demonstration of benchmarking . . . for perhaps only 10% of the cost of present benchmarks," the report said.

The staff also recommended that GSA revise the rules for qualifying new computer mainframe announcements to appear on the agency's general schedule and that "established major vendors with proven performance should be permitted immediate access to the schedule."

Further, GSA should limit request-for-proposal (RFP) specifications to only mandatory criteria, thus simplifying the evaluation process, the report said.

Finally, GSA should consider prereleasing "functional versions" of each DP RFP, the report advised, explaining that this policy would allow shortening of the time between an RFP's "technical release" and the final date for acceptance of responses.

Part of the House appropriations report entitled "Department of the Interior and Related Agencies' Appropriations for 1979," the investigators' remarks on "ADP procurement and standards" — which are directed at DP procurement practices throughout the federal government — are now under consideration by the committee.

Telefile Expands Management To Handle 50% Annual Growth

IRVINE, Calif. — Telefile Computer Products, Inc. has expanded its management structure to take advantage of new opportunities and to manage the company's 50% annual growth rate, according to S.V. Edens, the firm's president and chief executive officer..

Using the Xerox Corp. market as an example, Edens stressed the importance of familiarity with each customer's problems and requirements. "We are not just a supplier of enhancement products to Xerox users; we are part of the Xerox community. Each phase of our operations reflects our close association with the Xerox users group," Edens commented.

Many of the new managers have been associated with Xerox. Henry Haugland, head of the new Phoenix, Ariz., manufacturing facility, has worked in management positions at Xerox and Honeywell Information Systems, Inc. for nearly a decade. Bill Krauss, newly appointed director of market support, was with Xerox Data Systems for eight years and most recently was manager of Xerox software training at HIS.

Similarly, the new director of market planning, Randy Best, has held leadership positions with Exchange, the Xerox user group, for the past three years.

On the financial side, Edens reported that Telefile has continued its historical revenue gain and income loss patterns during the first half of fiscal 1978.

Unaudited revenues for the most recent six-month period ended March 31 increased 30% over the corresponding period in 1977. Revenues for the first half were $4.5 million.

The resulting net losses were $643,398 or 53 cents per share for the first half compared with $18,326 or 2 cents per share during the first six months of the previous fiscal year.

Telefile normally ships its greatest quantity of products during its last quarter, according to a company spokesman. Last year the company introduced a line of minicomputers with an eye to smoothing out the irregular quarterly revenue pattern.

Edens said he expects the usual earnings improvements will take place during the balance of the fiscal year ending Sept. 30.

Lessors Commend Managers' Efforts

WASHINGTON, D.C. — The Computer Lessors Association (CLA) named Gerald T. Wall, director of information systems of Bruno's, Inc. in Birmingham, Ala., "Executive of the Year" at the association's recent mid-year meeting in New Orleans.

Three other DP professionals cited for exceptional achievement were Charles E. Deal, vice-president of Rollins Leasing Corp. in Wilmington, Del.; John Murdoch, DP manager of Dixie Bearings, Inc. in Atlanta, Ga.; and W.H. Wylie, president of Advertising Management Systems, Ltd. in Toronto, Canada.

Awards were based on outstanding DP achievement with emphasis on price/performance, efficiency, economy and corporate effectiveness, CLA explained.

According to Wall, he came to the conclusion a long time ago that it wasn't necessary to spend a lot of money on the latest computer equipment.

Starting with an IBM 360/50 in 1974, Wall leased another 360/50 and extended the installed system in 1977 when he realized he needed more DP power. "This kind of price/performance thinking has saved Bruno's about $750,000 in rentals in the past six years," CLA noted.

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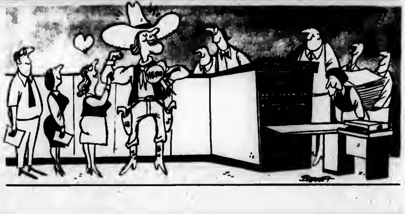

Survey Discovers

DDP Used in 40% of Financial Institutions

NEW YORK — More than 40% of the nation's financial institutions have adopted distributed DP (DDP) systems, according to a survey conducted by *Bank Systems & Equipment* (BSE), a Gralla publication.

BSE editor Alan Richman examined the motivations of banks and thrift institutions in opting for DDP systems as well as the operational problems encountered by these banking institutions in converting to a distributed system.

BSE predicted eight out of 10 banks and thrifts will eventually move to DDP systems.

Of the banks responding to the survey, 42% already used DDP, and Richman forecast that by the mid-1980s, 56% of the institutions will have such systems, with the eventual total expected to top 86%.

The loan departments of banks are currently the most frequent users of distributed systems. Sixty-five percent of those institutions that have adopted DDP reported activity in the loan department. The next three most frequently reported areas of DDP use in banks were savings (61.9%), checking (44.4%) and bank cards (31.7%).

However, BSE noted that those figures are skewed because few thrift institutions (savings and loans) offer checking account services. Therefore, when commercial banks were considered alone, checking account services emerged as the application with the heaviest DDP use (64.3%).

Aside from applications, Richman also analyzed bankers' motives in adopting DDP. Greater responsiveness to customer or user needs was the reason most often cited for the changeover (83.9%).

The next most frequently reported motive (62.5%) was to handle transaction-oriented, event-driven applications more effectively. For example, placing an on-line terminal at a bank officer's desk to assist in computing the best possible repayment schedule for a mortgage or installment loan was described as a typical event-driven usage.

Other benefits sought included better error control and correction, reduction of DP costs and workload and the elimination of duplication.

The BSE survey also examined the most significant operational problems banks and thrifts encountered in switching to DDP. The major types of problems discovered were in personnel conversion/training (31.3%), software (18.8%), communications/lines (16.7%) and hardware (14.6%).

Commenting on the 31% of the respondents who reported no problems, Richman asked, "Were they lucky or were they lying?" Answering his own question, he said, "Perhaps they really had no problems, but more than likely, what was a problem to some was a challenge to them."

The findings, published in the July issue of BSE, were based on 150 responses, half of them from banks and thrifts with more than $500 million in deposits.

The results of the survey are available from Gralla Publications, 1515 Broadway, New York, N.Y. 10036.

Japan to Relax DP Industry Guidelines

TOKYO — The Ministry of International Trade and Industry (Miti) will relax its guidance of computer makers here, allowing them to compete more vigorously with each other.

The move is being made, according to *The Japan Economic Journal*, to squelch foreign criticism that Japan is making computer development a national policy. However, in its study of policies for fiscal 1978, Miti has said that computers should be regarded as a top priority.

Japanese computer manufacturers are said to be developing a fourth generation system, comparable to the rumored IBM "E" series. And, the cost for developing such a system for commercialization is expected to be in the $10 billion to $12 billion range, which, according to *The Japan Economic Journal*, will nonetheless require Miti's assistance.

When Miti will still have a hand in fostering the computer industry in Japan, it is expected that its aggressive policies such as requiring computer companies to form groups to be eligible to receive financial asssitance will be lessened because of growing foreign pressure for a more open marketplace.

National Semi Gets Tax Bill

SANTA CLARA, Calif. — National Semiconductor Corp. has received a notice of proposed assessment from the U.S. Internal Revenue Service seeking approximately $24.1 million in additional income taxes for the fiscal years ended May 31, 1972 through 1975. The taxes relate mainly to proposed adjustments in transfer prices between U.S. and foreign operations.

The company said it will vigorously oppose the proposed assessment.

Regardless of the outcome, there should not be any effect on reported current earnings as the company has already provided for deferred taxes in excess of any amounts which may have to be paid.

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Small Systems Changing Marketing Scene

OJAI, Calif. — Smaller and more compact computer systems that bring the power of data processing to the fingertips of a wide spectrum of businesses are changing the way the computer industry markets its products.

During a recent three-day dealer meeting here, independent retailers who market one of the major brands of small business computers were given a broad view of the microcomputer market as it will develop into the 1980s by a team of top managers from Pertec Computer Corp. (PCC), which manufactures Mits computers and Icom microperipherals.

Ryal R. Poppa, PCC chairman of the board, president and chief executive officer, told those attending the session that the surge in sales of small business systems is just beginning and it should be well under way by 1980 when microcomputer sales will top $1 billion annually. "By the mid-1980s, this market will increase to more than $2 billion per year," he predicted.

Don M. Muller, executive vice-president and chief operating officer of PCC, said that to successfully market small business systems, dealers have to understand more than just computers. "They'll have to know about other people's business problems as well as their own," he said.

Educating the small business owner costs money and takes initiative. A $1.5-billion-a-year market means as many as 150,000 systems will have to be sold, Poppa added. That is equal to the number of computers sold during the first 20 years of the industry," he noted.

Cash Flow

"The ability of many small businesses to survive is tied to their ability to get immediate information on cash flow, inventories, overhead, supplier trends and competitive data. And the only systems that can provide it to them economically are microcomputers which, ironically, cost the same as another business tool, the automobile — $6,000 to $20,000," Muller noted.

Networks of independent computer centers are perceived as a way of putting the right equipment "under the nose of the prospect, to let him touch it, use it, see it function," Muller claimed. Small businessmen, many of whom are still unaware of the capabilities and price of these systems, are probably reluctant to invite big computer manufacturers to come to their firms and develop a bid. Therefore, someone has to talk to the prospects first, understand their needs and invite them to a demonstration center. Muller stressed that time will show this to be the way most small business systems are sold.

Even with the dealer's own service capability and capital resources, the retail computer store faces risks, Peter Zinsli, PCC product line manager, pointed out.

"One risk is in addressing vertical markets. If a dealer sells a system to a dry cleaner, he makes a mistake believing he can meet the requirement of every dry cleaner in the country. The salesman might think the customer is typical, but that is rarely the case," Zinsli warned.

Casualties in the shakeout of retail computer stores will be heavily weighted with people who underestimated the amount of effort needed to sell and service a vertical market. This includes both the custom software programs required as well as the promotion and marketing expense, Zinsli continued.

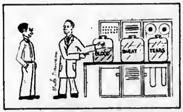
"If you have an idea that fits auto dealers or audio dealers, for example, find an expert in that field already — a CPA or a management consultant — and work with him. Don't go after these vertical markets directly or alone," Zinsli cautioned.

He also warned that the business is rapidly becoming very competitive and there is a danger in trying to be all things to all people.

"Understand the type of customer you want — small businesses and departments of large companies that function like a small business. Qualify each customer and don't be afraid to send a prospect to a competitor when the sale isn't really right for you," Zinsli told the dealers.

Correction

The New Registrations column in the Aug. 7 issue included a registration of 500,000 common shares for Datapoint Corp. This particular registration was filed with the Securities and Exchange Commission last Dec. 29.



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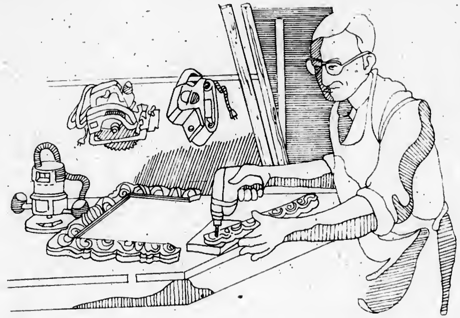

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Education Program Under Way

Council Aims Pro-EFT Drive at Consumers

NEW YORK — The Electronic Money Council (EMC) has mounted a public education campaign to reinforce the attitudes of people favoring electronic funds transfer (EFT) and to demonstrate its benefits to the segment of the population that is undecided.

The plan, announced at a recent news conference here, will include the showing of "The ABCs of EFT," a consumer-oriented film for television and speaker bureau use, according to Jo Heindel, EMC steering committee member and a marketing specialist for Harris Trust and New Savings Bank in Chicago.

In addition, Heindel introduced two consumer spokeswomen who will "carry the EFT story to the top 25 markets in the nation." The first, Barbara Quint, money management editor of *Family Circle* and a contributing editor of *Glamour*, is a frequent writer and lecturer on personal financial management.

The second, Sylvia Auerbach, introduced and teaches the "Women and Money" course at New York University and the New School for Social Research in New York. She is the author of three books on consumer economics and a frequent contributor to major magazines on money management.

Other planned public education activities will be an EFT news bureau to provide information on the positive aspects of EFT, an electronic media center and a directory of EFT installations.

Also planned are a speakers bureau and a variety of informational materials.

Bill of Rights

The council's positions on major consumer protection issues are spelled out in a nine-point Consumer Bill of Rights outlined at the conference by Joel Crabtree, EMC Executive Committee member and vice-president of Continental Bank and Trust Co. of Chicago.

"Experience proves electronic financial services improve efficiency and increase consumer protection and convenience," Crabtree claimed. "We urge EFT service providers to adopt this Bill of Rights and extend its protections to their customers voluntarily by contract and policy," he added.

In order to define the task of the council's public education effort, EMC sponsored a $200,000 study of consumer and opinion leader attitudes toward EFT. The independent survey, conducted by Cambridge Reports, Inc., comprised in-depth interviews with 1,650 Americans.

The study concluded that while fewer than half the people interviewed had heard of EFT, only 24% of those familiar with EFT were opposed to it, according to Michael Levine, EMC member and vice-president of Citibank.

Opinions Pro and Con

"Personal convenience was the benefit identified by 76% of these favoring EFT," Levine said. "Among those against the concept, fear of error was the most common negative, cited by 19% of the total population interviewed.

"Close behind, at 17%, was fear that the added convenience of EFT would encourage overspending," Levine added.

Responding to the fear of error, Levine said technological improvements have reduced errors in most EFT systems to the point of more than 99% reliability.

In the area of overspending, Levine claimed that because deposit balances can be accessed and authorizations for credit transactions obtained, the danger of overextension is reduced.

After EFT was explained to them, 33% of the consumers surveyed said they felt EFT services should be encouraged, 32% felt such services should be prohibited and the remaining 35% were undecided, Levine said.

"One of the major problems for consumers right now is the limitations imposed upon terminal deployment by an archaic and overregulated legal environment," according to Eugene M. Tangney, EMC co-chairman and executive vice-president at the First National Bank of Boston.

"Like reduced airfares resulting from more competition and less regulation," Tangney added, "a free regulatory environment for EFT will benefit consumers."

Tangney cited several successful EFT programs, including his bank's Money/One service, which has grown in two years to handle up to 40,000 transactions daily for more than 650,000 consumers.

"We have no illusions that public attitudes can be changed quickly," Herb Wegner, EMC co-chairman and president of Credit Union National Association, said. "Some consumer activists, legislators and opinion leaders will remain skeptical at best."

"Our objective is a fair and balanced treatment in the press, in government and in the minds of consumers. Specifically, we seek to prevent EFT from being overregulated before the public can appraise it," Wegner said.

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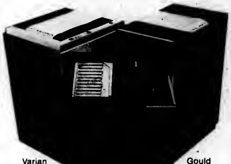

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STC Quarter Earnings Rise 109%

LOUISVILLE, Colo. — Storage Technology Corp. (STC) had a record quarter with earnings zooming 109% and revenues soaring 72%.

Earnings for the second quarter leaped to $5.3 million or 48 cents per share from $2.5 million or 25 cents per share in the same quarter a year ago.

Revenues topped $66.9 million, up from $38.9 million reported for last year's second quarter.

Six-month earnings netted $8.9 million or 80 cents per share with revenues clocking in at $121.2 million. For the comparable 1977 period, STC realized $4.4 million or 44 cents per share on revenues of $71 million.

All per share amounts have been adjusted to reflect the two-for-one stock split in the form of a 100% stock dividend issued on June 15 to shareholders of record May 15, the company said.

Comten Sets Record

ST. PAUL, Minn. — Donald J. Herman, president and chairman of the board of Comten, Inc., attributed the firm's record income and revenue for the second quarter to a 31% increase in rental and maintenance revenues and a 96% increase in sales revenues.

Earnings for the second quarter were $1.4 million or 53 cents per share, compared with 1977 second-quarter earnings of $494,000 or 19 cents per share.

Revenues for the first half of 1978 were $24.5, an increase of 59% over first half 1977 revenues of $15.4 milllion. Earnings for the six-month period topped $3.7 million or $1.38 a share, up 314% from 1977's first-half earnings of $901,000 or 35 cents per share. However, the firm utilized a $1.3 million tax loss carryforward in reporting the current six-month earnings.

Microdata Sales Double

IRVINE, Calif. — Donald W. Fuller, chairman and president of Microdata Corp., said third quarter revenues were up about 111% over last year's results. Revenues passed $19 million for the third quarter ended May 31 compared with 1977 third-quarter revenues of just over $9 million.

Earnings for the third quarter were $1.1 million or 53 cents per share, more than double the $532,000 earnings or 24 cents per share results of the third quarter a year ago.

Nine-month 1978 earnings were $2.7 million or $1.25, up dramatically from $1.2 million or 55 cents for the nine-month period last year.

Revenues for the nine-month period were $35.6 million, versus $23.6 million posted a year ago.

Fuller commented that Microdata's all-time record results include results of Computer Machinery Corp. (CMC). Microdata acquired a 75% interest in CMC last December and the remaining 25% last March.

Internationally, Microdata markets through its wholly owned subsidiary, CMC Ltd., in the UK and through authorized distributors in more than 50 countries.

Nickels & Dimes

A combination offering of 930,000 shares in Computer Communications, Inc. sold out at $7.65 each. The capital raised from the offering consisting of new shares and those of certain stockholders will be used to reduce debt and augment working capital.

Memorex Corp. has registered an offering of $1,019,536 in common shares with the Securities and Exchange Commission. Memorex said it will sell 500,000 shares for its own account with the remainder of the shares issued upon exercise of certain warrants outstanding.

$$$

Durango Systems, Inc. has completed its second round of equity financing, raising $2.5 million through a private placement. The new financing will support the manufacturing of a family of small computers and intelligent terminals as well as a sales force for the new line.

$$$

Itel Corp. has increased its quarterly cash dividend on common stock by 16%, raising it to 16 cents per share, payable Aug. 18. This is the third consecutive year of dividend increases since the start of dividend payments in October 1975.

$$$

National CSS, Inc. increased its quarterly dividend from 6 cents to 8 cents a share, payable Sept. 1.

$$$

NCR Corp. completed the sale of its Appleton Papers Division to B.A.T. Industries, Ltd. The sale will result in a nonrecurring net gain to NCR of $3.75 per share of common stock for fiscal 1978.

$$$

American Telecommunications Corp. has signed a definitive agreement to be acquired by General Dynamics Corp. General Dynamics has offered either $23.50 in cash or .47 shares of a new issue of General Dynamics preferred stock with an annual dividend of $4.25 per share.

$$$

Amdahl Corp. said it has arranged a multicurrency $100 million credit line with an international group of banks. The unsecured line supersedes a previous $24 million line with U.S. banks, the company noted. Although the company has no immediate plans to use the credit, the expanded line will eventually provide for expansion of international operations, particularly in Europe.

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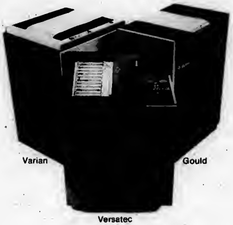

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Orders & Installations

The Valley News of Los Angeles, Calif., has installed a TMS-11 text and business management system from Digital Equipment Corp. The system is based around four PDP-11/70 processors which will manage editorial, production, classified advertising, circulation, accounting and payroll for the 250,000-subscriber morning daily.

Three savings banks in the Albany, N.Y., area have formed a computer services center and installed an on-line network to improve customer service and better control operating costs. The network of the Cohoes Savings Bank, the Home Savings Bank of Upstate New York and the Mechanics Exchange Savings Bank is controlled by an NCR Corp.N-8550 system.

Hilton International Co. has purchased four Micos business systems for facilities in the U.S. and Canada from Minicomputer Systems, Inc.

The Minnesota State University System has ordered a $2.1 million system from Univac. The Univac 1100/81 will be installed at the Administrative Center at St. Cloud State University, St. Cloud, Minn.

Clark Equipment Co. of Buchanan, Mich., in conjunction with its Industrial Truck Division dealers, has installed 17 Burroughs Corp. B1800s across the country.

A.O. Smith's Data Systems Division has installed the Amdahl Corp. 470V/6-II at its computer center in New Berlin, Wis.

The Lefferts Branch of the Queens Borough Public Library has installed the Gaylord Circulation Control System. All branches will be connected through a network of 83 terminals to one minicomputer in which the records of all 3.5 million volumes owned by the library will be stored.

Barnett Banks of Florida, Inc., a holding company, has ordered item processing systems valued at $3.3 million from the NCR Corp. The Phase 1 equipment includes 20 NCR 7750 distributive document processing systems with 70 on-line proof stations.

Safeway Stores has ordered multiple Datachecker power management systems from National Semiconductor Corp.

Security Life of Denver, Colo., has installed an Itel Corp. AS/4 with 2M bytes of main memory. In addition, the firm has installed 8 Itel Model 7330 disk drives and an Itel 7833 disk controller.

Data Care Systems has installed an on-line time-sharing system from Datapoint Corp. in its office at the Cedars-Sinai Medical Office Buildings in Los Angeles. The system will provide medical and dental practices patient billing services to the medical offices in the complex.

Family Federal Savings and Loan Association of Macon, Ga., has installed NCR Corp.'s Most system which uses four NCR 270 teller terminals in its main office and two branch locations.

Itel Corp.'s Data Services Group has purchased a Cyber 176 from Control Data Corp. for an estimated $7 million. The system will provide teleprocessing services for the Utility Data Services Division of the Data Services Group.

Chrysler Corp. of Detroit, Mich., has ordered a Univac 1100/82. The system will be installed at the Detroit headquarters of the Chrysler Export-Import Division. The key applications will be on-line receiving and stock allocation, on-line stock locator and picking tickets and shipping releases.

Ellsworth Community College, Iowa Falls, Iowa, has selected an NCR Corp. 8230 for use in its one-year program for training minicomputer operators and electronic accounting specialists.

Dearborn Federal Credit Union of Michigan has installed a Burroughs Corp. B3800 system to keep pace with expansion of services to its members. When a second B3800 is installed at the end of this year, the dual-processor system and peripherals will be valued at more than $1 million.

Decision Sciences Corp., a management consulting firm headquartered in Jenkintown, Pa., has purchased a Prime Computer, Inc. Model 400 to replace time-sharing services and cut computing costs in half. The firm will use the Prime 400 configured with 128K bytes of main memory and 60M bytes of disk storage, to develop analytical models that will assist clients in making more effective management decisions. The system will also be used for financial and marketing applications at the firm's headquarters and in its Washington, D.C.; Baltimore, Md.; and Los Angeles offices.

Unit No. 1 at Central Power & Light of Coleta Creek, Texas, will install a Honeywell Information Systems, Inc. Model 4500 which will monitor the power generation equipment.

Petroleos Mexicanos of Mexico City has installed two data entry systems valued at more than $800,000. The multimedia Scanedit system and a large OCR system from Scan-Optics, Inc. comprise the first of several installations planned by the government-owned Mexican oil company for major purchasing offices and warehouse facilities throughout the world.

Iowa Transfer System, Inc. has chosen an NCR Corp. N-8450 and an NCR 721 communications processor to handle electronic funds transfers among banks in the state.

Trailways, Inc. has ordered a Honeywell Information Systems, Inc. Series 60 Level 66 system valued at $2 million to support the company's current processing requirements.

The Montana State Liquor Division has ordered 20 NCR Corp. 2140 electronic cash registers for inventory control and accounting purposes as well as for transaction recording.

The Masonry Institute, headquartered in Chicago, has ordered a Univac 90/25 to speed the processing of information on behalf of the bricklayers and contractors.

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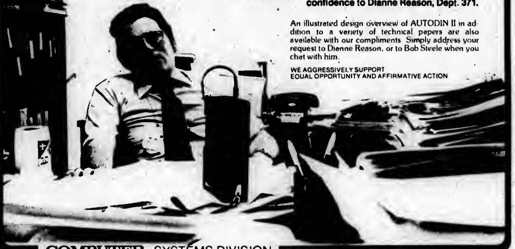

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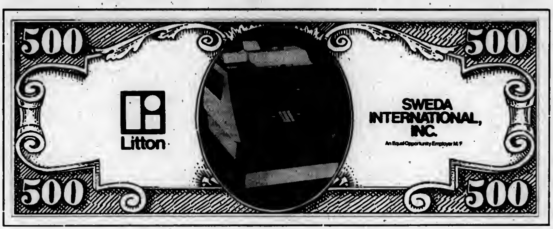

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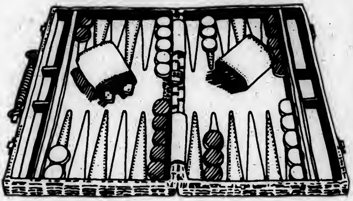

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SOFTWARE ENGINEERING ADMINISTRATOR

A challenging opportunity which supports the Director of Software and the Software Engineering Department. Requires knowledge of machine/people/space planning, general administrative responsibilities, support and generation of policies and procedures, and an ability to interact closely with project and corporate management. The successful candidate will have direct administrative supervision of software writers and responsibility for project support activities, in addition to general administrative duties. Experience required in working knowledge of the environments and methodology of software engineering practices and requirements, strong interpersonal skills, and background in general administration and accounting practices.

FOR IMMEDIATE AND CONFIDENTIAL CONSIDERATION,
send your resume, including salary requirements, to Fred Brillante, Dept. L1813

SYSTEMS
ENGINEERING LABORATORIES

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3033

Litton Mellonics Information Center (MIC) is one of the leading cost effective computer utilities in the Western States. Our processing center is linked to clients' offices by an extensive teleprocessing network.

Our full service data center currently runs a 168 AP, a 158 AP, and a 3033. We are installing our second 3033 in August of 1978.

Located in the pleasant San Fernando Valley, away from traffic and congestion, MIC is just 30 miles from Los Angeles and 30 minutes from the Pacific Ocean.

Challenging career opportunities

SYSTEMS PROGRAMMERS

Experience should encompass one or more of: MVT/MVS Internals, JES 2, IMS/VS, CICS/VS, TSO, VTAM/SNA, UTILITIES, ALC, and performance evaluation.

SYSTEMS ENGINEERS

Strong knowledge of JCL and MVT or MVS concepts. Programming skills in at least one of the following languages: PL/1, FORTRAN, APL or COBOL; assembler language skills; strong debugging skills and demonstrated ability to work with Data Center customers. TSO experience a plus.

PROGRAMMER ANALYSTS

Experience should include design, development, implementation and maintenance of information systems utilizing multiple IBM 168's operating under MVS with IMS, RJE and TSO facilities.

Should have 3-5 years of COBOL programming, preferably within IBM OS, VS, or MVS environments.

DATA BASE ADMINISTRATION

IMS Data Base design experience required, preferably as a member of a Data Base administration group. DC a plus, as we run a full DB/DC system.

For immediate consideration, please send your resume or write, including salary history, in confidence to:

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Rockwell International
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MS&S

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A multi-million dollar hard goods manufacturer located in VIRGINIA, is seeking a Data Processing Manager to design and implement business information systems. The qualified candidate will be a highly motivated self-starter who has worked in a manufacturing environment, with 2-3 years System 3 experience, and a proven record of establishing and supervising an EDP system. A college degree is desirable but not required. Total overall experience should be a minimum of 5 years in the data processing field.

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National Semiconductor

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Whatever you're seeking in a data processing career . . . Burger King has your opportunity.

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Degree of comparable experience. 2 years experience in systems programming MVS/TSO. 2 years experience with IBM 370 medium to large scale system. Experience programming and assembler including MACRO coding. OS internals, SMP, ALC systems and software installation VM/CMS a plus.

PROGRAMMERS

Degree or comparable experience. IBM 370 medium to large scale systems environment, COBOL a must. FORTRAN helpful, with TSO or CMS.

PROGRAMMER

Degree or comparable experience. Knowledge of mini-computer technology and assembly language programming, direct experience with IBM 3790 a plus.

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PROGRAMMER/ANALYST

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PROGRAMMER/ANALYST

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Primary emphasis will center on performing and tuning of the Data Base in our state-of-the-art IBM 3031 MVS, CICS, TSO, IMS distributive processing environment.

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The Minnesota Supreme Court is seeking a systems analyst to study process and procedure in court offices and to design and develop systems to obtain information for a state level management information system. The analyst will be responsible for maintaining the existing system and integrating new systems into the present state system. In-state travel is required. Applicant should have three years of analysis experience in manual and automated systems. Experience in designing and implementing high level management information systems is desired. Experience in court related systems is preferred. Salary $16,000 to $21,900, depending on experience. Send resumes to Director, State Judicial Information System, Room 304, 40 North Milton St., St. Paul, MN 55104. Resumes will not be accepted after Oct. 15, 1978. *An Equal Opportnity Employer*

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The University of Akron is seeking a Director of Computer Services who will provide the leadership necessary to support a combined academic and administrative computer center. The University of Akron supports an IBM S/370-158-3 operating under MVS with telecommunications. You should have strong technical skills in computer hardware and software, plus the ability to work at all levels of management. The ability to manege and supervise a staff of 60 people is e must: Ten years of experience in computer data processing with telecommunications is required with five of these years in supervisory or management capacity. The person we seek should have a master's degree. The salary level is open and will include a very liberal fringe benefit package, including a tuition resmission plan for you and your dependents.

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120 Littleton Road
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A working knowledge of the MVS operating system, JES2, and VSAM is required. VTAM experience is desirable. A bachelor's degree in Computer Science or related field is preferred.

We provide an excellent opportunity for talented systems programmers seeking continuing challenges in a state of the art information processing environment. Our corporate data center facilities utilize a 370/168 and 3033 with MVS, IMS/VS, CICS/VS, JES2, ACF VTAM/NCP, and TSO. We also provide computing support for Cummins Engine Company plants at various locations in the eastern half of the United States and in the United Kingdom.

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Personnel Dept.
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Preference given to applicant experienced on DEC PDP 11/40 with RSTS/E, BASIC programming, and a BS degree with emphasis in data processing or computer science. Salary to $15,000 DOE plus fringe benefits. RPG II and systems programming a plus.

Immediate opening. Applications accepted through September 8, 1975. Send confidential resume to:

Howard B. Kipple, Director, Computer Center
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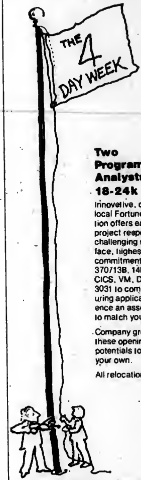

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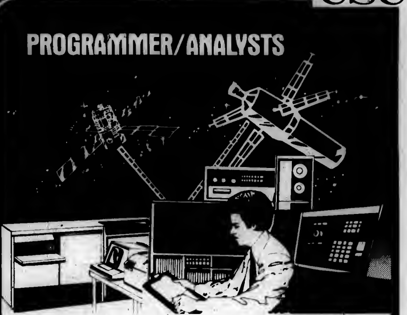

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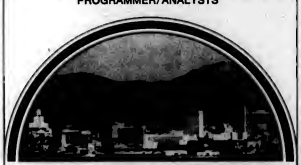

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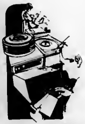

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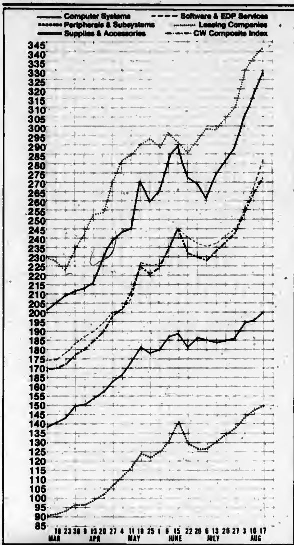

Earnings Reports

COMPUSERVE
Three Months Ended June 15

	1978	1977
Shr Ernd	$.14	$.28
Revenue	3,584,470	3,468,983
Earnings	160,669	300,530
6 Mo Shr	25	.58
Revenue	6,968,445	6,687,544
Earnings	280,960	642,420

DATARAM
Year Ended April 30

	1978	1977
Shr Ernd	$4.70	$2.30
Revenue	16,604,980	10,747,620
Tax Cred	.....	214,000
Earnings	2,226,035	1,169,000

INTEL
Three Months Ended June 30

	1978	1977
Shr Ernd	$.97	$.75
Revenue	93,682,000	a69,222,000
Earnings	10,683,000	7,963,000
6 Mo Shr	1.80	1.44
Revenue	173,938,000	a134,948,000
Earnings	19,465,000	15,266,000

a-Includes about $900,000 proceeds from business interruption insurance.

NATIONAL CSS
May 31

	1978	1977
Shr Ernd	$.53	a$.39
Revenue	14,242,000	11,374,000
Earnings	1,207,000	879,000

a-Adjusted for a 100% stock dividend paid in November 1977.

ON-LINE SYSTEMS
Year Ended April 30

	1978	1977
Shr Ernd	$1.66	$1.58
Revenue	22,618,507	16,001,020
3 Mo Shr	57	.46
Revenue	6,363,779	4,289,276
Earnings	507,357	416,117

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, AUGUST 16, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	28- 56	47	- 7/8	-1.8
N	BURROUGHS CORP	59- 85	85	+2 5/8	+3.1
O	COMPUTER AUTOMATION	23- 43	42 3/4	+1 3/4	+4.2
N	CONTROL DATA CORP	23- 42	41 1/2	+ 5/8	+1.5
O	CRAY RESEARCH INC	21- 58	57	+2	+3.6
N	DATA GENERAL CORP	42- 68	64 1/4	-3 1/2	-5.1
N	DATAPOINT CORP	34- 69	69 1/4	+3 1/8	+4.7
N	DIGITAL EQUIPMENT	39- 54	49 1/2	-1 1/4	-2.4
N	ELECTRONIC ASSOC.	2- 8	7 1/4	0	0.0
A	ELECTRONIC ENGINEER.	11- 19	13 3/8	- 3/8	-2.7
O	FOUR-PHASE SYSTEMS	19- 39	39 1/4	+1 3/4	+4.6
N	FOXBORO	28- 40	39 3/8	+ 3/8	+0.9
O	GENERAL AUTOMATION	7- 25	24 1/2	+1	+4.2
O	GRI COMPUTER CORP	1- 1	1 3/4	+ 3/4	+75.0
N	HEWLETT-PACKARD CO	62- 90	86 7/8	-2 5/8	-2.9
N	HONEYWELL INC	43- 72	71 3/8	+ 3/8	+0.3
N	IBM	236-297	296 3/4	+8	+2.7
O	MANAGEMENT ASSIST	9- 24	23 5/8	+ 3/8	+1.6
O	MICRODATA CORP	10- 21	20 7/8	+1 1/2	+7.7
O	MINI-COMPUTER SYST	5- 8	6 1/4	0	0.0
C	MODULAR COMPUTER SYS	7- 15	14 1/4	- 1/2	-3.5
N	NCR	37- 64	64	- 1/8	-0.1
N	PRIME COMPUTER INC	20- 39	31 1/2	+1 1/8	+3.7
N	PERKIN-ELMER	17- 28	27	-1	-3.5
N	RAYTHEON CO	29- 58	55 1/8	-3 1/8	-5.3
N	SPERRY RAND	33- 49	49	+1 5/8	+3.4
A	SYSTEMS ENG. LABS	11- 21	19 1/8	+ 7/8	+4.7
A	WANG LABS.	12- 30	30	+4 1/8	+15.9

LEASING COMPANIES

EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 6	5 7/8	0	0.0
O	BOOTHE COURIER CORP	13- 18	16 1/4	- 1/4	-1.5
C	COMDISCO INC	5- 17	16 1/4	+1 1/4	+8.3
A	COMMERCE GROUP CORP	1- 1	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 1	1	0	0.0
M	DATRONIC RENTAL	1- 2	1 3/8	0	0.0
A	DCL INC	3- 4	4 1/4	+ 1/4	+6.2
N	DPF INC	8- 14	12 5/8	-1 1/4	-9.0
N	ITEL	16- 33	33 3/8	+1 1/8	+3.4
N	LEASCO CORP	24- 36	35 1/2	- 1/2	-1.3
O	LEASPAC CORP	1- 4	3 3/8	+ 1/2	+17.3
A	PIONEER TEX CORP	5- 7	5 5/8	0	0.0
N	U.S. LEASING	13- 20	19 3/8	- 3/8	-1.8

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/8	0	0.0
O	ANACOMP INC	8- 22	20 7/8	- 1/8	-0.5
A	APPLIED DATA RES.	8- 16	16 1/4	+ 3/4	+4.8
N	AUTOMATIC DATA PROC	24- 36	34 7/8	+ 1/8	+0.3
O	COLEMAN AMERICAN COS	1- 2	1 3/4	0	0.0
O	COMPU-SERV NETWORK	7- 12	7 3/4	0	0.0
O	COMPUTER HORIZONS	1- 5	8 1/4	0	0.0
O	COMPUTER NETWORK	8- 13	12 7/8	+1 1/4	+10.7
N	COMPUTER SCIENCES	8- 16	15 1/2	- 1/2	-3.1
O	COMPUTER TASK GROUP	1- 6	3	0	0.0
O	COMPUTER USAGE	2- 4	3 1/8	+ 1/2	+19.0
O	COMSHARE	6- 19	18 1/4	+ 1/4	+1.3
O	DATA DIMENSIONS INC	4- 8	7 3/8	+1 1/4	+20.4
O	DATATAB	1- 2	1	+ 1/8	+14.2
N	ELECTRONIC DATA SYS.	15- 23	21 3/8	- 1/2	-2.2
O	INSYTE CORP	1- 2	2 1/4	- 3/8	-14.2
O	IRS COMPUTER MARKET.	2- 3	3 1/4	0	0.0
O	KEANE ASSOCIATES	3- 6	5 3/8	- 1/8	-2.2
O	KEYDATA CORP	1- 3	2	- 1/8	-5.8
A	LOGICON	11- 18	17 7/8	+1 5/8	+10.0
A	MANAGEMENT DATA	1- 1	7/8	0	0.0
A	NATIONAL CSS INC	15- 34	33 3/8	+ 3/8	+1.9
O	NATIONAL DATA CORP	7- 12	11 3/8	+ 1/2	+4.4
A	ON LINE SYSTEMS INC	17- 28	27 1/2	+1 1/4	+4.7
A	PLANNING RESEARCH	4- 9	8 3/4	+ 3/4	+9.3
O	PROGRAMMING & SYS	1- 1	1	+ 1/4	+33.3
O	RAPIDATA INC	3- 6	6 3/8	+ 3/4	+13.3
O	REYNOLDS & REYNOLD	18- 34	33 1/2	+3	+9.8
O	SCIENTIFIC COMPUTERS	3- 6	6 7/8	+1 1/8	+19.5
O	TYMSHARE INC	18- 32	32 1/4	+4	+14.1
A	URS SYSTEMS	5- 7	7	+ 1/2	+7.6
M	WYLY CORP	1- 3	4 1/2	+ 1/2	+12.5

PERIPHERALS & SUBSYSTEMS

EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	14- 31	31	+2	+6.8
O	ADVANCED MEMORY SYS	7- 17	16 3/8	- 1/8	-0.7
N	AMPEX CORP	10- 17	16 7/8	+ 7/8	+3.4
O	ANDERSON JACOBSON	5- 10	8	- 5/8	-7.2
N	APPLIED DIG DATA SYS	13- 18	15 1/4	+ 1/4	+1.6
O	BEEHIVE INT'L	4- 7	3 3/4	0	0.0
A	BOLT,BERANEK & NEW	6- 11	9	- 1/8	-1.3
M	BUNKER-RAMO	10- 18	18	0	0.0
A	CALCOMP	3- 10	9 1/4	- 5/8	-6.3
O	CAMBRIDGE MEMORIES	3- 8	7 1/2	0	0.0
N	CENTRONICS DATA COMP	16- 31	30	- 5/8	-2.0
O	COGNITRONICS	1- 4	2 1/4	- 1/4	-10.0
O	COMPUTER COMMUN.	6- 10	10 7/8	+1 3/4	+19.1
O	COMPUTER CONSOLES	4- 10	8 1/2	-1	-10.5
A	COMPUTER EQUIPMENT	3- 6	4 3/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 2	2	+ 1/4	+14.2
O	CONTIN	9- 37	36 7/8	+4 7/8	+15.2
N	CONRAC CORP	19- 26	23 3/4	+ 1/4	+1.0

EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	3- 5	8 1/4	+2 1/4	+37.5
O	DATA 100	9- 20	18 3/4	+1 1/4	+7.1
A	DATA PRODUCTS CORP	15- 24	22 3/4	- 1/2	-2.1
O	DATUM INC	2- 5	4	0	0.0
O	DECISION DATA COMPUT	2- 5	4 7/8	+ 3/4	+18.1
O	DELTA DATA SYSTEMS	1- 1	1/2	- 1/4	-33.3
A	DOCUMATION INC	6- 27	25 5/8	- 1/2	-1.9
O	DATARAM CORP	6- 24	18 3/4	+ 3/4	+4.1
N	ELECTRONIC M & M	4- 8	7 1/2	+ 3/8	+5.2
O	FABRI-TEK	1- 2	1 1/2	+ 1/8	+14.2
O	GENERAL COMPUTER SYS	1- 3	2 5/8	+ 5/8	+31.2
N	HAZELTINE CORP	10- 16	14 3/4	- 1/4	-1.6
N	HARRIS CORP	60- 67	67 3/8	+1	+1.5
O	INFOREX INC	6- 10	9 5/8	- 1/4	-2.3
O	INFORMATION INTL INC	8- 12	12	+1 3/4	+17.0
O	INTEL CORP	39- 62	55 1/2	-2	-3.4
A	LUNDY ELECTRONICS	4- 5	5 1/8	+ 1/8	+2.5
O	NSI DATA CORP	12- 19	15 5/8	+ 1/8	+0.8
N	MEMOREX	27- 36	56 1/4	+3 1/2	+6.6
N	MOHAWK DATA SCI	6- 15	13 7/8	+ 3/8	+2.7
O	OMEX	2- 2	2	0	0.0
O	PENRIL CORP	5- 12	10	0	0.0
N	PERTEC CORP	9- 14	12 3/4	+ 7/8	+7.3
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	QUANTOR CORP	2- 3	2 3/8	- 1/8	-5.0
O	RECOGNITION EQUIP	7- 13	12 7/8	- 1/2	-3.7
O	SCAN DATA	1- 5	3 3/4	- 3/8	-8.9
N	STORAGE TECHNOLOGY	19- 46	26 7/8	+ 3/4	+2.8
O	T BAR INC	11- 19	16 1/8	0	0.0
O	TALLY CORP.	4- 9	7 1/4	+ 1/4	+3.5
A	TEC INC	6- 11	10	- 3/8	-5.8
N	TEKTRONIX INC	33- 46	46 1/4	0	0.0
N	TELEX	3- 8	7 1/4	+ 1/2	+7.4
O	TESDATA SYSTEMS CR	13- 20	19 1/4	0	0.0
O	WILTEK INC	1- 1	7/8	- 1/8	-12.3

SUPPLIES & ACCESSORIES

EXCH		1978 RANGE (1)	CLOSE AUG 16 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 10	10	+ 7/8	+9.5
O	BALTIMORE BUS FORMS	2- 3	3 1/2	0	0.0
A	BARRY WRIGHT	14- 28	27 1/8	- 5/8	-2.2
O	CYBERMATICS INC	1- 1	1 1/4	- 1/8	-9.0
O	DUPLEX PRODUCTS INC	18- 28	26 3/4	- 3/4	-2.7
N	ENNIS BUS. FORMS	8- 17	15	- 1/8	-0.8
N	3M COMPANY	43- 64	64	+1 3/4	+2.8
C	MOORE CORP LTD	26- 34	31 1/4	- 3/4	-2.3
N	NASHUA CORP	18- 31	29 1/2	- 1/4	-0.8
O	STANDARD REGISTER	20- 26	22 1/2	- 1/2	-2.1
A	TAB PRODUCTS CO	8- 19	15 1/8	+3 1/8	+25.7
N	UARCO	19- 27	25	+1	+4.1
A	WABASH MAGNETICS	10- 18	18	+1 1/2	+9.0
N	WALLACE BUS FORMS	18- 29	28	- 1/8	-0.4

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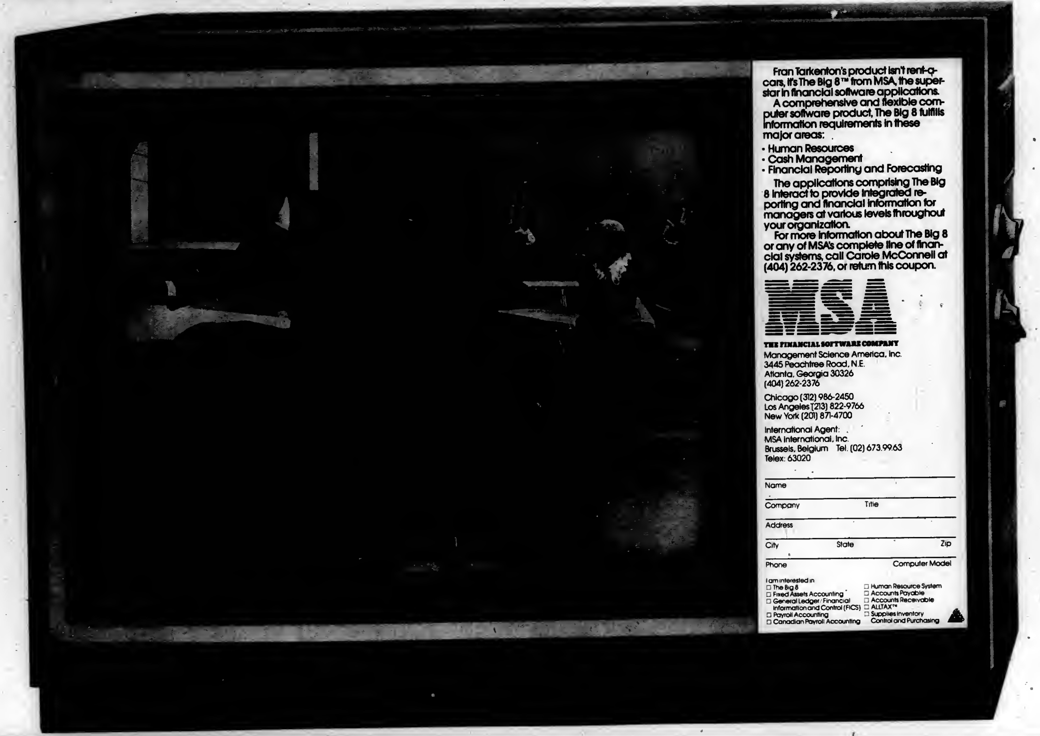

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